Integrating Design Thinking Practices into the Public Sector

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ABSTRACT

This paper argues that design thinking is well suited for addressing wicked problems in the public sector because many of the methods used in design are closely aligned with existing public sector strategies. An in-depth analysis of user centered, collaboration, and creative thinking practices found in the public sector and design thinking compares what the different strategies set out to achieve and how they impact problem solving. From this comparison, I identify areas where these strategies can converge to create new integrative ways of working that produce more innovative results. The integrative practices introduced provide a framework for applying design thinking to the public sector.

Keywords: design thinking, public sector, wicked problems, innovation, user-centered, collaboration, creative thinking, engagement

INTRODUCTION

The purpose of design is to conceive and plan what does not yet exist. Designers imagine new realities by looking holistically at a problem (Burns et al., 2006) and interpreting connections between seemingly unrelated things (Fisher, 2012b; Kolke, 2010; Peirce, 1988), thus creating innovative solutions.(Buchanan, 1992). This approach to problem solving, also called design thinking, is highly transferable and can be applied to almost any problem (Buchanan, 1992; Burns, Cottam, Vanston, & Winhall, 2006). Recently more and more people have recognized this claim, as design practices are used to develop solutions for problems outside of traditional design fields. Business plans and organizational structures now are designed thanks to books such as Roger Martin's *The Design of Business* (2009) and Tim Brown's *Change by Design* (2009). Medical providers like Mayo Clinic and Kaiser Permanente now have full-time in-house designers to improve the delivery of medical care. Using design practices has helped these organizations and businesses look at problems through a new lens and develop more innovative solutions.

The trend has slowly crept into the public sector. There is strong encouragement to use design thinking to improve governance, policy making, and the delivery of public services. Design consultancies, such as Participle in the United Kingdom, Mindlab in Denmark, and The Australian Centre for Social Innovation (TACSI), have used design methodologies to tackle public problems regarding alarming health

issues, confusing bureaucratic processes, and increasing demands of family crisis services. These projects, and others similar, are noted for positively changing people's experiences dealing with reoccurring, complex issues that previously were difficult to overcome (Bason, 2010; Participle, 2008; TACSI, 2011b).

The transfer of design skills to other fields is responding to the demand for new ways of problem solving. Albert Einstein is often quoted for saying, "No problem can be solved with the type of thinking that created it." This is even more relevant in a time when modern problems are quickly becoming complex. Complexity has arisen because of growing diversity in society, interdependence of important players, and uncertainty in a rapidly changing world (Innes & Booher, 2010). These 'wicked problems' are ill-defined, contain confusing and conflicted information, and are more likely to produce unintended consequences (Rittel & Webber, 1973). Traditional hierarchical and silo organizational structures designed to break down problems are not effective in deciphering high levels of complexity and interconnectedness (Burns et al., 2006). Therefore, new ways of working, different from those that helped create the wicked problems, are necessary.

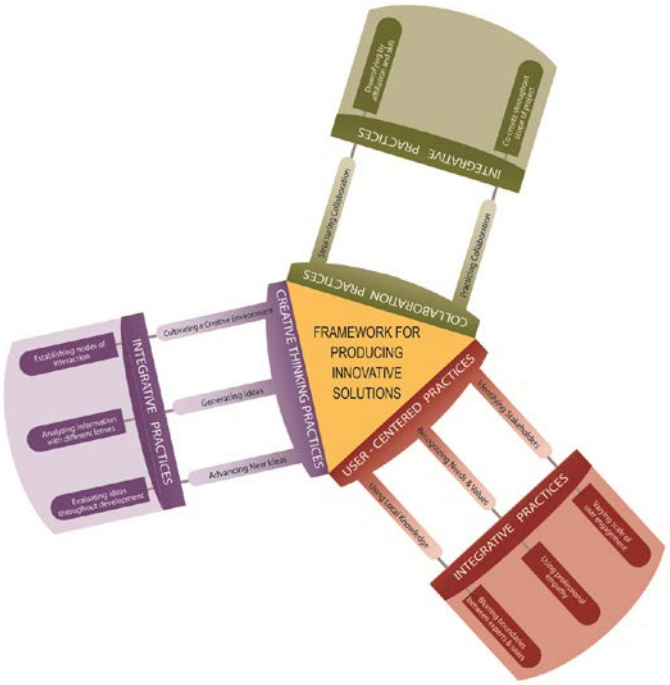
Many believe that design thinking is one of the appropriate new ways of working to effectively address wicked problems (Bason, 2010; Buchanan, 1992; Burns et al., 2006; Dunne & Martin, 2006; Fisher, 2012a) because it produces innovative solutions. Each wicked problem is unique and new, therefore requires solutions not yet realized. Many public managers have accepted the need for innovative solutions to address wicked problems, but do find it difficult to create these types of results in the public sector (Bason, 2010) due to a strong risk-averse culture and structural barriers (Bason, 2010; Bommert, 2010; Borins, 2001; Moore & Hartley, 2008; Mulgan, 2008). Research proposes that successful innovation in the public sector would be more feasible if the public sector was more responsive to citizen needs (Bason, 2010; Moore & Hartley, 2008), created collaborative networks (Bommert, 2010; Eggers & Singh, 2009; Moore & Hartley, 2008), and promoted new ways of thinking (Eggers & Singh, 2009; Stoyko, 2006). A design approach can help achieve innovation in the public sector because the needs mentioned above are inherently found in design thinking methods. Design thinking places people at the heart of the solution, involves multiple parties in analyzing the situation, and explores new ways of

thinking about the problem (Burns et al., 2006). In this paper, I define these efforts as practices called—1) user-centered; 2) collaboration; 3) creative thinking.

There is a growing amount of literature explaining how to apply design thinking user-centered, collaboration, and creative thinking practices to fields outside the design disciplines. However, the research presents design thinking as a completely new approach and rarely considers how these practices would be integrated into current efforts of tackling wicked problems. Discussing design thinking practices in this way, I believe, unintentionally makes applying design thinking to a new field seem intimidating, risky, and too large of an undertaking. In regards to the public sector, using design methods certainly presents new ways of working, but employing them does not require a complete overhaul to current practices. Through my research and experience in both the architecture and public sector fields, I have recognized that many strategies used in the design thinking practices of user-centered, collaboration, and creative thinking, while manifested differently, are also found in the public sector. In order for design thinking methods to be more widely recognized and used as a problem solving method to achieve innovation, research needs to illustrate how design thinking can be integrated into existing theories and practices found in the public sector.

This paper sets out to provide a foundation for that research. It looks at how strategies in both the public sector and design thinking field can work together to more effectively address wicked problems. First, I further define design thinking and its process. Then, I analyze public sector and design literature to compare how efforts to employ user-centered, collaboration, and creative thinking practices are manifested in both fields. From this analysis, I

Figure 1- New Integrative Practices for Innovation



suggest new ways of applying user-centered, collaboration, and creative thinking practices that integrate public sector and design thinking efforts. These integrative practices I identified provide a new framework to more effectively produce the innovative solutions needed to address wicked problems (See Figure 1). Next, I present two case studies to demonstrate different ways of using these integrative practices to address public sector wicked problems. I conclude with a discussion about the limitations of applying design thinking to the public sector and propose further avenues of research.

WHAT IS DESIGN THINKING?

Design thinking is the term coined for approaching a problem using a designer's sensibilities and methods in order to meet people's needs (Brown, 2009; Burns et al., 2006). Design thinking is distinctive because it is generative and goal driven. Designer thinkers start with what is desired or needed by people and then find ways to make that possible with current resources. In contrast, many public sector decision makers tend to look at the resources available and then determine what results those resources can produce. To achieve a desired goal, designers imagine ways of doing things that have not been done before, rather than analyzing and choosing between existing possibilities (Dunne & Martin, 2006; Fisher, 2012a).

This differs from more traditional, linear ways of thinking such as inductive and deductive reasoning where a person determines what *should be* or *what is*. Designers use abductive reasoning to imagine *what might be* based on given observations and experiences (Dunne & Martin, 2006). Abductive reasoning is also described as adopting a hypothesis based on an inference gathered and suggested by the facts (Peirce, 1988). "Abductive logic allows for the creation of new knowledge and insight" (p. 20) as arguments to the best explanation of what could be are introduced (Kolke, 2010). Designers use abductive reasoning to move back and forth between analysis and synthesis, interpreting the knowledge being gathered and imagining it in new situations. This is accomplished by thinking divergently about the information to multiply options and create choices, then narrowing the options and making choices with convergent thinking (Brown, 2009). Using both divergent and convergent thinking creates more robust solutions because many ideas are generated and then compared against one another until only the strongest and most relevant remain.

The mental models used in the design thinking are applied throughout the various stages of the design thinking process. The actual articulation of this process varies from project to project and designer to designer, but most commonly includes phases of gathering inspiration and information about the problem, generating new ideas, and implementing solutions (Bason, 2010; Brown, 2009; d.school, 2009). Design is fundamentally an exploratory process; therefore these phases are not necessarily completed in a linear fashion (Brown, 2009). A project may circle back to a stage at any point in the project as designers refine their ideas and explore new directions. For example while in the idea generation stage, a designer may realize more information is needed in order to further develop an idea and go back into the inspiration and research stage. Tim Brown, CEO of IDEO, a design consultancy firm says it is best to think of the stages "as a system of overlapping spaces rather than a sequence of orderly steps" (Brown, 2009, p.16). The user-centered, collaboration, and creative thinking practices analyzed in this paper are used throughout all stages of the iterative, non-linear design thinking process.

USER-CENTERED PRACTICES

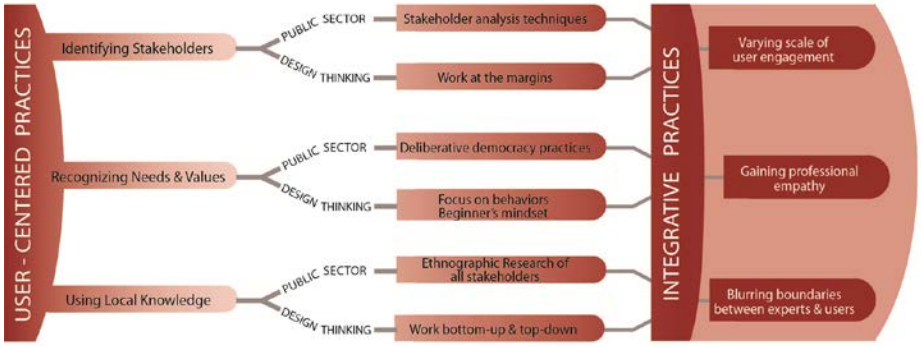
User-centered practices incorporate the perspectives of those affected by a given problem into decision making processes. This practice is beneficial when addressing wicked problems because it reveals how the problem affects the lives of individuals and identifies the gap between reality and desired experiences. The users' needs, values, and aspirations become key drivers to understanding the situation and developing solutions to improve it. In design thinking, this simply means, as stated by Tim Brown, "to put people first" (Brown, 2009, p. 39). When designing with a user-centered practice, decisions are made from the point of view of the individual rather than the infrastructure of the system (Brown, 2009; Burns et al., 2006). With this approach the main purpose of design is to create something that produces meaningful results in people's lives.

The public sector has also begun to embrace this sentiment. For the first half of the 20th century, a hierarchical system allowed public officials the autonomy to design and implement policies and programs, where the public value is defined based on objectives of the public officials rather than those of the citizens (Denhardt & Denhardt, 2000; Roberts, 2004). However substantial research has demonstrated that many programs and policies produced poor results because decision makers failed to

address the needs and concerns of citizens (Bryson, 2004; Mettler & Soss, 2004; Roberts, 2004; Schneider & Ingram, 2006). This realization has created a strong movement to place the citizen at the center of the democracy and have them more involved in public sector decisions (Mettler & Soss, 2004; Schneider & Ingram, 2006).

In response to this movement, a variety of public engagement strategies are used to involve citizens in decisions that have substantial effect on their lives (Roberts, 2004). Some strategies look to simply elicit citizen input about specific decisions being made, while others work collaboratively with citizens to create a community that engages in an ongoing stream of issues (Quick & Feldman, 2011a). Many design thinking strategies placing the user at the center of the problem can help achieve the second set of objectives. To understand how to incorporate these strategies into public sector problem solving approaches, I analyze how each discipline identifies stakeholders (Bryson, 2004), recognizes what users value (Fung & Wright, 2001; Nabatchi, 2012; Denhardt & Denhardt, 2000), and uses local knowledge (Innes & Booher, 2010) and suggest how these efforts can work together to produce the innovative solutions needed for addressing wicked problems (See Figure 2).

Figure 2- User-Centered Practices



IDENTIFYING STAKEHOLDERS. In order to effectively employ user-centered practices, there must be a clear definition of who is a user. Users, also referred to in the public sector as stakeholders, are seen as "any person, group or organization that can place a claim on the organization's attention, resources, or outputs, or is affected by that output" (Bryson, 2004, p. 22). An important part of the problem solving process is accurately identifying who the problem affects/ involves and why. This is even more important when addressing wicked problems because their interconnected nature makes it difficult to decipher where responsibility and involvement lie (Bryson, 2004). The public sector has developed a variety of

stakeholder analysis techniques to help decide which stakeholders are relevant to a particular problem. Specific techniques, such as power versus interest grids and stakeholder influence diagrams measure different interests and power bases in order to determine who is involved and how they are influential. Generally, these decisions are based on who has what information and whether or not their participation is depended on for successful implementation (Bryon, 2004).

The design thinking process does not have specific techniques for identifying relevant users. Contrary to the analysis techniques described above, design thinkers define users very broadly to prevent them from accidentally disregarding users whose significance may not become known until a later time. This means working at the margins and engaging with extreme users, some of whom may not even have a direct connection to the problem. This helps recognize things that may not be obvious when observing groups in which known assumptions already exist (Brown, 2009; d.school, 2009). For example, when hired to design kitchen gadgets for the elderly to use easily, IDEO, a design consultancy firm, recognized that children also experience challenges when operating gadgets. The design team observed how children interacted with the gadgets to gain insights about operating deficiencies that may not have been recognized due to assumptions the design team held about the target user group (Brown, 2009). Working at the margins can amplify needs and realities of the problem that may otherwise go unnoticed and produce surprising insights. This can be particularly beneficial for complicated wicked problems where traditional stakeholder analysis techniques may not fully capture the entirety of the problem.

Many in the public sector may be hesitant to expand the scope of user participation beyond immediate users because they believe user involvement requires too many resources (Bason, 2010; Roberts, 2004). However, there does not need to be a blanket approach for all stakeholders involved. Integrating stakeholder analysis techniques with the design thinking notion of working at the extremes can help engage the participants with a better sense of purpose. A participation planning matrix, for example, can help decide if it is important to fully engage extreme users in the creation of solutions or if consulting them and soliciting their feedback is adequate for a particular problem (Bryson, 2004). The information from the analysis helps appropriately design the degrees of user participation at different stages of the project, thus removing inefficiencies and making user involvement more feasible while still capturing the needs and insights that otherwise might not be readily apparent.

While identifying stakeholders can help better define the problem and make sense of its complex components, the analysis techniques should not restrict the divergent thinking used in the design process. Instead, when addressing wicked problems with design thinking and public sector strategies, I suggest stakeholders be identified by moving back and forth between working at the margins and using formal analytical techniques, varying the scale of user engagement. This integrative practice of varying the scale of user engagement, as indicated in Figure 2, allows the problem solvers to gather as much information as possible and then have a framework for converging and synthesizing the relevant ideas.

RECOGNIZING THE NEEDS AND VALUES OF USERS. A user-centered focus is used when decision makers want their solutions to influence the lives of users in a meaningful way. Understanding what users' value can provide the insights needed to create those solutions. The public sector has developed practices of deliberative democracy, which allow for the engagement of diverse perspectives in public decision making, in order to understand what the public values. Through an open and accessible two-way communication process (Gastil, 2008; Nabatchi, 2012), deliberative practices encourage public officials and citizens to listen to each other's positions and generate group choices that everyone can accept in one way or another (Fung & Wright, 2001) rather than discerning public interest through the aggregation of individual input (Reich, 1988). When practicing deliberative democracy, public officials do not set out to respond to one specific, present-day problem but rather provide the space for citizens to develop a collective vision around the longer range and broader interests of the community (Bryson & Crosby, 1992; Denhardt & Denhardt, 2000). Deliberative democracy asks those involved to create a tangible, clear problem definition, prioritize related values, and arrive at a well-reasoned solution based on diverse points of view (Fung & Wright, 2001; Nabatchi, 2012; Roberts, 2004). These discussions generate an appreciation of "others' perspectives, new understandings of policy options, and broader recognition of resources" (Quick & Feldman, 2011a).

Researchers in the public sector have expressed the need for deliberative practices to lead to action (Abers, 2000; Fung & Wright, 2001). However, it can often be difficult to translate discussions about values and goals into concrete experiences and services. People do not typically think in goals, but rather in their daily life experiences (Innes & Booher, 2010); therefore ideas communicated in a deliberative discussion may not directly reflect people's experiences or needs. As conveyed by Henry

Ford, “If I’d asked my people what they wanted, they’d have said a faster horse” (Brown, 2009, p. 40). Brown (2009) believes a design thinker’s real challenge is to help people articulate their latent needs and wants.

To overcome this challenge, design thinking methods focus on people’s behaviors. When doing direct observation, it is important to notice what people do and what they do *not* do. These behaviors demonstrate how people cope with complex, contradictory situations and provide clues about the range of unmet, latent needs (Brown, 2009). This reveals the disparities between the experiences people are having with the ones they desire. Often designers will try to fully understand this gap by placing themselves directly in the situation users are experiencing. When contracted to improve hospital services, IDEO sent one of its designers through the Emergency Room experience, as if he were a patient, from admission to procedure (Brown, 2009). From this research, the design team recognized that the hospital facilities were designed around the needs of the professional staff and did not consider the patient journey. The design team’s work was not generalized from their own standards and experiences, but rather they saw the world through the eyes of others and used that insight to guide their design decisions (Bason, 2010; Brown, 2009).

The design thinking field calls this professional empathy. For Brown (2009), empathy is an important distinction between academic thinking and design thinking. Designers are not trying to generate new knowledge, but want to translate existing knowledge and experiences into solutions that will improve lives. To help gain professional empathy, design thinkers adopt a beginner’s mindset, where one suspends biases and assumptions that may misconstrue understandings of the situation (Brown, 2009; d.school, 2009). When possessing a beginner’s mindset one must suspend judgment, question everything, be truly curious, find patterns and themes, and really listen and absorb what is being observed (d.school, 2009). Professional empathy can help decision makers develop solutions truly based on user experiences and perspectives and connect directly with people’s needs and values.

From comparing how both the public sector and design thinking recognizes the needs and values of users, I suggest decision makers extend the boundaries of deliberative practices beyond *discussing* values to *experiencing* those values firsthand by focusing in behaviors and employing a beginner’s

mindset. This will help them use the integrative practice of gaining professional empathy, as indicated in Figure 2, to truly understand the wicked problems from the perspective of the users.

USING LOCAL KNOWLEDGE. Involving citizens in public decisions has forced public administrators and managers to perceive and use local knowledge differently. In the past, decision makers believed only expert, technical knowledge was needed to solve problems (Roberts, 2004). However in a complex world, experts need additional local and other lay knowledge to better explain the evolving, interdependent environment (Innes & Booher, 2010). Citizens and other users directly experience the problems that decision makers are trying to understand. "Local knowledge fills gaps, provides information about context, and offers pragmatic, experience-based insights from those who know a situation firsthand" (Innes & Booher, 2010, p. 179). This information can be gathered in a number of ways, from focus groups and surveys to storytelling and cultural experiences (Innes & Booher, 2010). The more traditional methods, such as focus groups and interviews, are effective to capture what people already know and can articulate. However, an increasing number of public sector organizations are recognizing the complexity of wicked problems and have begun using ethnographic techniques, such as participant observation or contextual interview, to understand the interactions between citizens and public services from the user's perspective (Bason, 2010). With this rich subjective and contextual data, experts can make more effective decisions because they have a bettering understanding of the relationships and interactions difficult to articulate from the outside.

Many public managers are afraid of using local knowledge because they believe it means they need to relinquish their decision making authority (Roberts, 2004; Bason, 2010). In design thinking, applying the user centered practice does not mean the users have full autonomy over the design and decisions. Rather, the users are contributors to a process in which the knowledge and insight gained from interacting with them are used to guide and inform the solutions created. User input is only one aspect of the design process that influences a given solution. In addition to starting from the bottom-up, design thinking works from the top-down to ensure that there is alignment between the ideas put forth by the users and the objectives of the systems that will implement those ideas (Brown, 2009; TACSI, 2011). When completing research for a design challenge, designers conduct the same level of ethnographic

research, described in the section above, with experts and professionals because they too experience and interact with aspects of the problem being solved.

In design thinking, having a user-centered focus means designing solutions that are meaningful for all those involved. This mentality blurs the lines between expert and citizen and allows the designers to see how realities are aligned with the assumptions being made from both users and experts. The disparities identified become leverage points for improvement and help direct the focus of the project. This implies the integrative practice, I articulate in Figure 2, of gathering information from both the layman and expert perspectives to blur the boundaries between experts and users can help to effectively address wicked problems. This knowledge can then be integrated and translated into solutions that consider the needs and values of both parties.

The analysis above demonstrates that public sector and design thinking user-centered practices can be used in conjunction with one another to more effectively address wicked problems. The integrative practices of varying scale of user engagement, using professional empathy, and blurring the boundaries between experts and users will help achieve the innovation desired by the public sector because they create solutions more responsive to citizen needs and values.

COLLABORATION PRACTICES

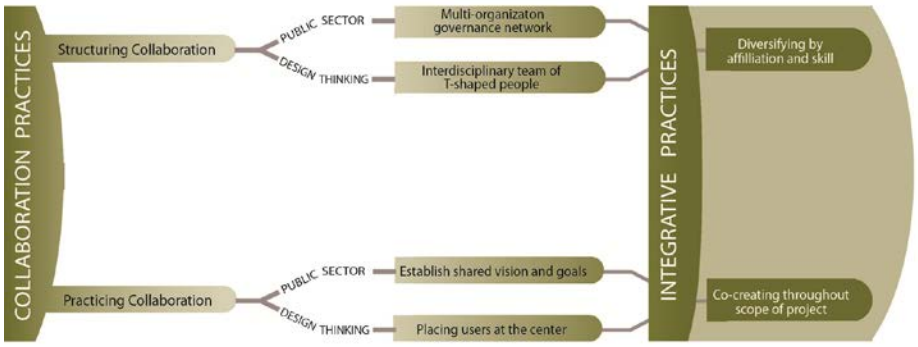
Collaboration occurs when two or more entities, be it individuals or organizations, work together to achieve jointly what they could otherwise not accomplish alone (Brown, 2009; Crosby & Bryson, 2005; Emerson, Nabatchi, & Balogh, 2012; Gray, 1989; McGuire, 2006; Roberts & Taylor, 1991; Wood & Gray, 1991). Collaboration is believed to be particularly useful for addressing wicked problems because these problems surpass the traditional discipline and organizational boundaries, are rarely the sole responsibility of a single entity, and require multiple types of knowledge and expertise (Bryson et al., 2006; Emerson et al., 2012; McGuire, 2006; Moore & Hartley 2008; Quick & Feldman, 2011b; Burns et al, 2001; Kettl, 2006; Wood & Gray, 1991). Bringing together many of the entities associated with the wicked problem can help better define the problem and decipher the interconnected relationships.

Collaboration also provides an opportunity to involve many different voices and perspectives that may otherwise not have been heard. Collaborations should use inclusive techniques to mutually assure

that all perspectives are legitimately, comprehensibly, and accurately represented regardless of power dynamics (Innes & Booher, 2010). "Only by uncovering what is hidden under socially constructed understandings can there be any hope of seeing past the disempowering language and expectations of society" (Innes & Booher, 2010, p. 93). While it is impractical to think that every individual actor could feasibly be included in the collaborative process, it is also not productive to simply gather a selection of diverse voices. "Diverse perspectives prove most valuable if they embed information relevant to the problem being solved" (Page, 2007, p. 7). The goal is not to use the diverse knowledge to find what is right or best, but to develop ideas that draw connections between everyone's point of view (Innes & Booher, 2010; Nemeth & Nemeth-Brown, 2003).

These ideas about collaboration are found in both the public sector and design thinking, but each discipline manifests them differently. Much of the public sector literature discusses collaboration in terms of building relationships among different types of organizations (Bryson et al., 2006; Goldsmith & Eggers, 2004; McGuire, 2006; Provan, 2008; Roberts & Taylor, 1991; Wood & Gray, 1991), whereas design thinking methods focus more on bringing together individuals from a variety of backgrounds to create a diverse collaborative team (Brown, 2009; Burns et al., 2006; Lehrer, 2012;). In the sections below, I compare the collaborative structures and processes found in both the public sector and design thinking. This analysis will demonstrate how the two approaches can be integrated when using design thinking collaborative methods in the public sector (See Figure 3).

Figure 3- Collaboration Practices



STRUCTURING COLLABORATIONS. In the public sector, collaborations are more often described as governance and cross-sector networks; relationships formed either vertically between different levels of government or horizontally among governments, businesses, non-profit communities, and/or the public as a whole (Bryson et al., 2006; Goldsmith & Eggers, 2004; McGuire, 2006; Kettl, 2006; Provan, 2008; Emerson et al., 2012). Different examples of networks demonstrate varying intensities of collaboration falling on a continuum of organizational relationships from cooperation, where informal personal relationships lead to shared knowledge, to realignment, where changes to organizational structure or governance occur (Sandfort & Milward, 2007). These networks are believed to break down discrete boundaries and allow for the sharing of information, resources, responsibilities, and skills (Bryson et al., 2006; Goldsmith & Eggers, 2004). In this structure, the individuals involved are still bound by the organizations they represent and some believe they should retain their autonomy and independent decision making powers (Wood & Gray, 1991).

Roberts and Taylor (1991) believe this is why public sector collaboration has not produced innovation. Based on their field study of stakeholder collaboration, they concluded "to produce radical innovation, the stakeholder representatives would have needed to be free agents not bound or limited by their association's point of view" (Roberts & Taylor, 1991). Some research suggests public sector collaborations should attempt to build connections and capacities that redefine rather than simply span boundaries in order to achieve the innovative results required by wicked problems (Quick & Feldman, 2011b).

The structure of design thinking collaborations often blur and redefine boundaries. Rather than multi-organizational networks, interdisciplinary teams, comprised of "T-shaped" people are used to address design problems. "T-shaped" people have strength in two dimensions; a vertical axis where their depth of knowledge around a particular topic allows them to make effective contributions to the team and a horizontal axis where they incorporate skills from other fields to enhance how they use that core knowledge (Brown, 2009). Examples of "T-shaped" people are architects who studied ethnography or engineers with marketing experience. No matter what an individual's background, they are likely to be strong in their core discipline and able to connect to adjacent disciplines (Burns et al., 2006). T-shaped

people help make connections between the entities in a collaboration, blurring the boundaries of the organizations.

On an interdisciplinary team, people don't only bring value to the collaboration because they have unique information or skills, but also because they process that information differently (Dunne & Martin, 2006). In addition to bringing together different organizations that all have a stake in a problem, design thinkers focus on bringing together people with diverse skills and expertise. For example, a business person may use an analytical lens to evaluate whether or not something is efficient and effective; whereas, a sociologist might take that same information and explain why it changed people's behaviors in a certain way. Applying different skills to the same wicked problem allows new patterns to emerge that can strengthen the understanding of how the system works as a whole.

In recognizing these patterns, the interdisciplinary team is able to envision possibilities beyond their own organizational and analytical perspectives, leading to innovative solutions. This way of collaboration is dependent on an individual's acceptance of multiple perspectives and willingness to explore how they can be integrated with his/hers expertise. Individuals are required to be confident and strong enough in their expertise to be willing to go beyond it (Brown, 2009). An interdisciplinary team is valuable for addressing wicked problems because it provides the multiple ways of knowing needed to better understand the problem's complexity and encourages entities to think beyond their own individual perspective and organizational boundaries.

Both approaches to structuring collaboration are beneficial when addressing wicked problems. The multi-organizational aspect is necessary to break down the hierarchical boundaries found in the public sector and the interdisciplinary component can process and dissect the many different types of information. Therefore, I suggest design thinking and public sector collaboration approaches be integrated to create collaboration structures that are diversified by both organizational affiliation and problem solving skills as presented in Figure 3. This will allow the wicked problem to be addressed from multiple perspectives.

PRACTICING COLLABORATION. Given the organizational orientation of public sector collaboration, many public sector collaboration processes are focused on building and fostering the relationships between entities. Many public sector scholars believe establishing shared rules, goals, and decision-making

processes between the entities are an essential first step in the collaboration process (Bryson et al., 2006; McGuire, 2006; Roberts & Taylor, 1991; Thomson & Perry, 2006; Wood & Gray, 1991). Without initial agreements the collaboration may have difficulty agreeing on next steps or enforcing accountability (Bryson et al., 2006). Initial agreements set the tone for how the work will get done and directly affect the outcomes of the collaboration (Bryson et al., 2006; Gray, 1989). Huxham and Vangen, in their extensive research, have come to believe relationships should be nurtured over time rather than defined by prearranged agreements. "Sometimes it is best to get started on some action without fully agreeing on the aims" (Huxham, 2003, p. 405).

Another aspect of the collaborative process discussed in public sector literature is the need to reconcile the tension between the interests of individual entities and the collective interest of the collaborative (Thomson & Perry, 2006; Wood & Gray, 1991). A tension exists because individuals need others to adequately address their problems, however the entirety of the problem might not fall under their specific mission or goals (Thomson & Perry, 2006). Research has shown that in order to make progress on the collective goal, relationships should be mutually beneficial (Thomson & Perry, 2006). Collaboration is most successful, Wood and Gray (1991) have found, when those involved can satisfy one another's differing interests without loss to themselves. Other researchers, however, suggest rather than negotiating differences and keeping interests distinct, collaborations should attempt to build connections between differences to create communities that can permeate fixed or rigid boundaries (Quick & Feldman, 2011b)

In design thinking, the purpose of collaboration is to bring together the entities that can help improve the lives of the users (Brown, 2009; Burns et al., 2006). The needs of the users drive the goal and visions of the collaboration and the entities involved align their differences to work towards this shared goal. This is often accomplished by engaging the users as active participants in the collaboration as well. This is often referred to as co-creation where citizens contribute to the planning, design and delivery of solutions (Bason, 2010; Bovaird, 2007; Brudney, 1983). This means that all parties involved contribute resources to the efforts and have a legitimate voice (Bason, 2010; Bovaird, 2007). Users are located more centrally in the decision making and the top-down approach is eliminated (TACSI, 2011a; Bovaird, 2007). It goes beyond service providers being responsive to citizens' needs, but having the

willingness to work with citizens to develop solutions that improve the experience for everyone in the collaboration, including the users (Brudney, 1983).

The concept of co-creation has begun to be practiced in the public sector. However, Quick and Feldman (2011a) highlight that it is typically used to define the issue and policy solutions to address it. They suggest the use of inclusive practices, where users participate in the planning and implementation process as well to eliminate the boundaries between designers and participants (Quick and Feldman, 2011a). Design thinking methods strive to achieve this as well. Co-creation is used through the entire scope of the project to break down the "us vs. them" mentality and adopt "us *with* them" practices (Brown, 2009).

Kaiser Permanente realized the benefits of designing *with* rather than designing *for* when struggling to implement a new nurse information exchange program, despite the concept being co-developed and successfully field tested in several pilot units (Lin, Hughes, Katica, Dining-Zuber, & Plaek, 2011). The nurses at one hospital could not see the connection between the story being told from other units to the operations and problems occurring at their own hospitals. To overcome this, the Kaiser Permanente design team asked the users at each hospital to share their own personal experiences of exchanging information between nurses and then worked with hospital staff to tailor the solutions to fit the needs found in those experiences (Lin et al., 2011). Even though the situation was very similar at all the hospitals, users at each implementation site needed to make the solution their own before fully accepting and adapting it.

The Kaiser Permanente example demonstrates wicked problems can be addressed more effectively when solutions are co-created because those affected by the problem become invested in making the ideas a reality. Based on this example and the above analysis, I suggest, when addressing wicked problems with design thinking collaborative practices, users be placed at the center of the collaboration and engage in co-creation throughout the scope of the project and beyond, as illustrated in Figure 3. Maintaining a user focus through collaborative work will help produce results that are meaningful and feasible for all those involved.

While there are some differences in the public sector and design thinking approaches to collaboration, both disciplines use collaboration to bring together diverse groups of people that want to

work towards a common goal. Integrating collaboration practices from the design thinking and public sector can more effectively address wicked problems by incorporating the collaboration integrative practices of diversifying by affiliation and skill and co-creating throughout the scope of the project.

CREATIVE THINKING PRACTICES

Creative thinking is the means of producing novel and useful ideas (Amabile, 1983; Mednick, 1962) and the process of imagining what never existed (Lehrer, 2012). This practice is especially relevant to wicked problems because, by definition, they "never before existed" (Rittel & Webber, 1973) thus requiring solutions that also never before existed. For many years, it was believed that creativity was a trait only some people possessed; those who had it were more likely to produce new ideas (Amabile, 1983; Lehrer, 2012). However, in-depth studies and scientific research demonstrate that creativity is in fact inherent in every person. Scientist Mark Beeman identified a region located in the brain's right hemisphere just above the ear that transmits gamma waves whenever new insights occur (Beeman & Bowden, 2000). These waves are created when the brain makes original connections to make sense of discrete information. Additional research has demonstrated that different contexts and interactions can induce the creative thinking needed to make those connections (Amabile, 1983; Barret, Balloun, & Weinstein, 2005; Brown, 2009; Lehrer, 2012; Suh, 2005; Woodman, Sawyer, & Griffin, 1993).

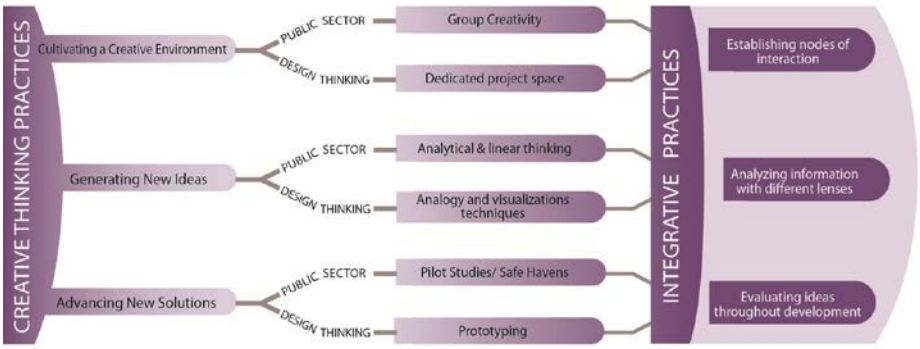
Before discussing how to cultivate creative thinking, I need to clarify the distinction between creativity and innovation. Too often these words are used interchangeably in the public sector literature. This is understandable since both are associated with novel ideas. However, creativity is generating new ideas and innovation is implementing those new ideas (Amabile, 2006; Eggers & Singh, 2009). This paper adopts the belief that creativity is a key input, a starting point for innovation (Amabile, 2006). Without producing new ideas there would be no new things to implement. Others see this distinction as unnecessary because creativity that is not implemented has very little value; therefore the term becomes synonymous with innovation (Stoyko, 2006). That position, however, does not align with the theory of this paper which suggests user-centered and collaboration practices also contribute to producing innovation. Discussions on innovation describe how to integrate novel ideas into current realities, but do not

necessarily explain where the ideas come from. An analysis of creativity using research from psychology and design disciplines provides insight about where these ideas originate and how to produce them.

Creativity is further defined as the process of "forming associative elements into new combinations which either meet specific requirements or are in some way useful" (Mednick, 1962). Creativity is about connecting unrelated thoughts in order to lessen the gap between reality and desired outcomes. It is the constraints and realities of the purpose and goal that help drive the creativity (Dunne & Martin, 2006), forcing the ideas to be more useful and meet the demands placed on them (Bonnardel, 2000). In this context, creativity does not necessarily need to be a completely new idea, but rather an idea that has never before been applied to a specific situation (Lawson, 1997). The creative process, broadly defined to include stages of problem definition, research, ideation, and validation (Drazin & Kazanjian, 1999; Mednick, 1962; Lubart, 2001), consists of a variety of techniques and behaviors that elicit creative thinking.

While these techniques and behaviors are fundamental to the design thinking process, their application has not been widespread in public sector practices due to barriers such as a risk adverse culture, service delivery pressures, constraining organizational arrangements and fear of public blame (Bason, 2010; Bommert, 2010; Borins, 2001; Moore & Hartley, 2008; Mulgan, 2008). Despite these constraints, it has been recognized that more creative thinking is needed to address the wicked problems currently being faced (Bason, 2010). In the following sections, I analyze the strategies used in both disciplines to cultivate a creative environment, generate new ideas, and advance new solutions and suggest how these efforts can be integrated to produce more creative thinking when addressing wicked problems (See Figure 4).

Figure 4- Creative Thinking Practices



CULTIVATING A WORKING ENVIRONMENT. Traditionally the public sector has not be been known for providing an environment that encourages creative thinking (Bommert, 2010; Borins, 2001; Eggers & Singh, 2009; Moore & Hartley, 2008; Mulgan, 2008; Stoyko, 2006). Hierarchical and silo structures and closed, top-down processes found in public sector organizations limit those who have the power and resources to generate and implement creative ideas (Bommert, 2010; Borins, 2001; Eggers & Singh, 2009; Moore & Hartley, 2008; Mulgan, 2008). Little transparency exists below senior management (Bommert, 2010), making it difficult to access the knowledge, information, and inspiration needed to make creative connections among various information. In addition, many people spend much of their energy on the delivery of immediate services and meeting day to day goals, leaving very little time to consider how things might be done differently (Mulgan, 2008). Despite these barriers creative thinking does occur in the public sector, however, it is often not widely recognized or noted. It tends to be a "one-off event" rather than a series of new approaches that change the problem solving culture (Eggers & Singh, 2009).

Desires to make the public sector environment more supportive of creative thinking are not new. Eggers and Singh (2009), in their *Public Innovators Playbook,* suggest networked governance, as discussed in the previous collaboration section, be used to induce creative thinking. Proposals for more collaborative innovation suggest the focus of creativity should be determined by the availability of assets and not by the formal boundaries of bureaucratic organizations (Bommert, 2010; Eggers & Singh, 2009; Mulgan, 2008). Hierarchical silos must be broken down so that people have access to the knowledge needed to make creative connections and "discover, develop, and implement ideas in and out of organizational boundaries" (Eggers & Singh, 2009, p. 10).

These ideas are closely aligned with theories of group creativity. Research on creativity in diverse groups shows ideas produced with multiple perspectives are more original, more complex, and of higher quality (Milliken, Bartel, & Kurtzberg, 2003). Idea generation is strengthened with group creativity because it utilizes a wide range of knowledge and expertise at many different levels to tackle complex problems (Bommert, 2010). To generate more ideas, participants in a group should be encouraged to share those diverse perspectives and unique information rather than discuss their similarities (Paulus &

Nijstad, 2003). Focusing on what is common provides no opportunity to evaluate and refine new ideas and may produce ideas with little substance and value. Incorporating time for feedback and constructive criticism is essential for effective group creativity. When participants know that there will be open, candid dialogue to improve on their ideas, they are likely to contribute more robust and original ideas (Lehrer, 2012).

Many design thinking firms promote group creativity not only through their organizational structures, but in their physical structures as well. Pixar Animations designed their studio to include numerous large communal spaces, such as a central atrium, coffeehouses, and eateries, which promote casual interactions between employees from all departments. While many of the conversations may not be directly related to the specific work at hand, Pixar believes random conversations are a constant source of good ideas (Lehrer, 2012). The exchange of knowledge is what stimulates real creativity says Alvy Ray Smith, co-founder of Pixar Animations Studio. “That’s when the best stuff happens: when someone tells you something you didn’t already know” (Lehrer, 2012, p. 155).

Organizational studies professor, Tom Allen, confirms this idea. Through observational research, he discovered people who consistently engaged in the most interactions had the most useful new, ideas (Allen, 1977). Pixar does not leave these interactions to chance. Bathrooms and mailboxes, essential destinations for every employee, are located only in the center of the building, forcing people to run into others. Each time one of these ‘run-ins’ helps the designer make a connection, new understandings and insights about the wicked problem at hand are gained.

IDEO believes that it is also important to have a dedicated space where designers can continually interact with the project material and information, in addition to other people. The firm allocates special “project rooms” large enough to keep the accumulated research materials, ideas, concepts, etc. on display and available for the duration of the project (Brown, 2009). CEO, Tim Brown, says, “The simultaneous visibility of these project materials helps us identify patterns and encourages creative synthesis to occur much more readily than when resources are hidden” (Brown, 2009, p. 35). Bringing people together in a shared space promotes the interdisciplinary teams described in the collaboration section. The materials and resources on display no longer belong to one specific individual or

organization but rather become collective knowledge of the team. This information can then be processed and developed through many different lenses by a variety of people at the same time.

When using both design thinking and public sector methods to address wicked problems, creative thinking can be stimulated through organizational structures and processes as well as physical spaces. There I suggest integrating these elements and establishing deliberative nodes of interaction, as represented in Figure 4, to cultivate a creative working environment. This helps prompt the brain to imagine new realities and connections among seemingly unrelated information required to address wicked problems.

GENERATING NEW IDEAS. Society, for many decades, has been in the midst of an Information Age, where analytical and linear thinking has dominated how work gets done (Pink, 2006). The public sector is no different. A brief scan of literature discussing the common policy analysis approach demonstrates this clearly (Bardach, 2009; Dunn, 2003; Walker, 2000; Weimer, 2004). Policy analysis is a rational, systematic approach that selects policy options based on the results of cost benefit analysis conducted using existing information (Walker, 2000). Similar to deductive and inductive thinking, policy analysis uses what is known to make a decision most appropriate for what they hope to see in the future. The sequential process of defining the problem, assembling evidence, constructing and evaluating alternatives based on established criteria (Bardach, 2009) can make it difficult to explore and imagine new realities. Even in the stage of constructing alternatives, Bardach (2009) suggests the analyst begin with alternatives that are already on people's minds and then attempt to be creative and invent alternatives by analyzing a *checklist* called "Things Governments Do." He shows little faith in this method, however and proclaims, "it's good to brainstorm, to try to be creative—but don't expect that you will necessarily produce much better ideas than those that other people have already advanced" (Bardach, 2009, p. 16).

While Bardach's belief is not necessarily held by all in the field, it does however, give reason to think critically about how information is represented and analyzed in the public sector. Analytical and linear thinking used by the public sector are still needed to organize and process complex information, however, wicked problems also demand seeing the big picture, crossing boundaries, and being able to make connections between seemingly unrelated pieces (Lehrer, 2012; Pink, 2006). Design thinking uses

analogy and visualization techniques to stimulate this second way of thinking. Interpreting analogies and visuals encourages one to find overlapping associations between information, activating the part of the brain that makes new connections and induces creative thinking (Lehrer, 2012). These techniques allow the mind to suspend current perceptions and break existing cognitive paths. Research suggests that when old relationships and ways of thinking are abandoned, the mind moves in new, unimagined directions (Amabile, 1983).

Information and ideas are most commonly communicated through written, verbal language. It can often be hard to see or learn something new when the representation of the information is expected and predictable. Visualization helps make sense of complex information and present the information from a different perspective (Burns et al., 2006). "Drawing (or images) can simultaneously reveal both the functional characteristics of an idea and its emotional content" (Brown, 2009, p. 80, parenthetical author's addition). I experienced this in my own work when working with a library system that wanted to enhance experiences between users and staff. Our design team asked the library staff to find and take pictures representative of different types of library experiences that were important to them. The discussion of these photographs was very informative because it told us the context of what happened at the library as well as the staff's priorities and feelings towards particular interactions.

Analogies are an effective technique for imagining new relationships that are not immediately apparent. Applying the components of one problem domain to a familiar situation helps recognize relationships that may be applicable, but never considered in the problem at hand. I used this tactic when helping a non-profit organization articulate their purpose. Lost in the nomenclature of words like mission, vision and strategic plan, I asked the group to look at the situation from another perspective and imagine the organization as a house in a neighborhood. As they identified their 'neighbors' and discussed existing and desired relationships, the group was able to recognize what contributions they brought to the neighborhood and translate them to the purpose of the organization. The analogy helped the group make sense of the problem domain and imagine alternatives because they could draw parallels between a world they understood and the new one they were creating.

It can also be helpful to examine an analogous situation that may not be directly associated with the problem domain but have features related to the realities or desired outcomes. For example, when

IDEO was attempting to improve the efficiency and operating procedures of a hospital trauma center, the design team observed the intricacies of an Indy 500 racecar pit stop (Brown, 2009). Both situations involved highly specialized professional teams working with state of the art tools in a short, fast-paced time frame. Looking at this analogy provided a new frame of reference that revealed relationships not found in the problem domain, but could help improve it (Brown, 2009). In experimental studies of creative professionals, psychologist Bonnardel (2000) found that designers who used precedent examples from other domains produced more creative solutions because they were able to rethink and improve features of the existing examples to make them applicable to their problem domain, thus producing a multitude of new ideas.

Both approaches to generating new ideas are beneficial when addressing wicked problems. Analytical and linear thinking is necessary to organize and process complex information and analogy and visualization techniques can help see the entire system and make new connections between the complex information. Therefore, when integrating design thinking and public sector methods to generate creative ideas, I suggest information be analyzed with multiple lenses, as depicted in Figure 4, to more effectively address the wicked problem.

ADVANCING NEW SOLUTIONS. The creative ideas generated from the techniques mentioned above are only useful for addressing wicked problems if they can be appropriately developed and implemented into the public sector. This is not easy because new ideas get suppressed in the risk-averse culture that acts in fear of public blame (Bommert, 2010; Mulgan, 2008). The risk of spending scarce resources on projects that may not work can prevent organizations from testing new ideas (Eggers & Singh, 2009; Stoyko, 2006). "Public scrutiny and media cynicism make it dangerous for public employees to launch any sort of new initiative except the kind that is virtually guaranteed to succeed" (Eggers & Singh, 2009, p 39).

To mitigate the fear and risk of failure, scholars have suggested the public sector create 'safe havens,' separate areas freed from organizational constraints and premature criticism (Eggers & Singh, 2009; Mulgan, 2008). These working spaces allow people to develop emerging ideas through low-risk experimentation and pilot studies. Eggers & Singh (2009) emphasize the need to try something, fail quickly, learn from the experience, and move on to the next idea. However too often in the public sector,

pilot studies are not launched until the ideas are believed to be fully polished. Because things learned in pilot studies are often only disseminated when the evaluation results are positive and effective (Eggers & Singh, 2009; Jann & Wegrich, 2007), many decision makers may be reluctant to try something unfinished for fear the entire project may be abandoned. The pilot studies are used as test and evaluation tools to see if a program is worth implementing further, rather than a development tool that can be used to improve and build on the emerging ideas.

Instead of pilot studies, design thinkers create prototypes to help them advance their current thinking. Prototypes are used much earlier in the process than a pilot program. They are rough and simple representations of an idea to help designers learn about its strengths and weaknesses (Brown, 2009). These prototypes are often quick and dirty to make an idea tangible as soon as possible so it can be evaluated and provide insight for the next more defined and more detailed prototype. Keeping it rough and quick also minimizes the cost and risk of failed ideas. Also, quick prototypes prevent mediocre ideas from being actualized because they are easier to disregard when little investment and commitment went into their development (Brown, 2009). Traditionally designers build prototypes to represent physical objects. It can be more difficult to imagine creating prototypes for solutions such as, services, systems, and policies. However, design thinkers have found alternative ways for prototyping benefit tackling these atypical design challenges. Borrowing techniques from the film industry, designers use storyboarding, role playing and video scenarios to communicate nonphysical experiences. These storytelling techniques also have the added benefit of keeping the user at the center of the idea, rather than mechanical or aesthetic details that can become distractions in physical prototyping (Brown, 2009).

The prototypes used in design thinking by no means stay confined to the project room or safe haven space. Design thinkers ask different user groups to interact with and evaluate them at a variety of stages to better understand how an idea might perform in the real world. They observe and listen to how users respond to the experiences simulated by the prototypes. The feedback and insights help assess what needs to change in order for the solutions to be feasibly implemented and aligned with existing behaviors and routines. The designers go through an iterative process of generating prototypes, receiving feedback, and modifying prototypes through the entire problem solving process. Even during implementation, the design team may choose to unveil “bite-size” parts of the solution to the users over

time, allowing for both designers and user to make adjustments as needed (Lin et al., 2011). Through prototyping, decision makers can identify and overcome some barriers, making it less risky to launch new solutions because there is a greater sense to how people will response and behave in various situations.

The public sector tends advance new solutions once they are fully polished and well-developed. As indicated earlier, this often brings about high-levels of risk and uncertainty. To mitigate these challenges, I suggest incorporating the prototyping methods used with pilot studies and safe havens approaches to test, evaluate, and refine ideas throughout the development process not just during the implementation phase. This will help ensure that the new solutions being advanced produce the desired results.

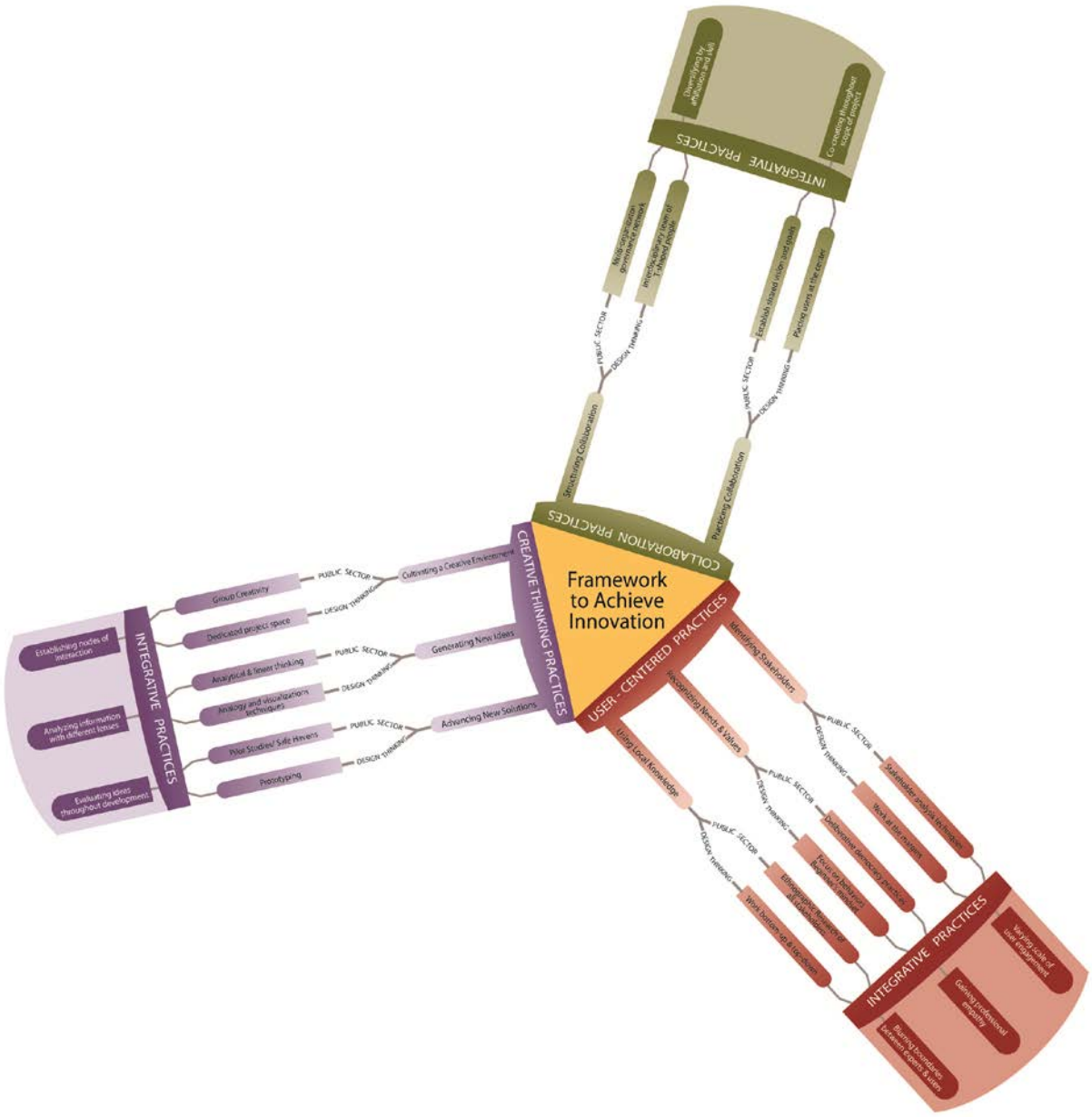
While using creative thinking techniques is not necessarily new to the public sector, integrating design thinking strategies can help induce more creative efforts. To achieve this, decision makers should establish nodes of interaction, analyze information from different lenses, and evaluate ideas throughout their development. These integrative practices will help produce the innovative solutions necessary to address wicked problems.

INTEGRATING DESIGN THINKING AND PUBLIC SECTOR METHODS TO ACHIEVE INNOVATION

As stated in the introduction, many believe that design thinking methods and the innovative solutions they produce can more effectively address wicked problems. The analysis above, however, demonstrates that many public sector strategies complement the design thinking efforts and also help tackle these complex issues. Figure 5 illustrates how these strategies can come together to form new integrative practices that I believe will produce more robust innovative solutions. When working with user-centered practices, varying the scale of user engagement, gaining professional empathy, and blurring the boundaries between experts and users helps identify how people are affected by the wicked problem and what solutions would produce meaningfully address their needs and values. Creating multi-organizational and interdisciplinary collaborations that co-create throughout the scope of the project can help decipher complex relationship and understand wicked problems from multiple perspectives. Creative thinking practices can help make new connections and realities about the problem when nodes of interaction are established, information is analyzed through different lenses, and ideas are evaluation

throughout the development process. Based on my research, I have come to believe that these integrative practices are possible in the public sector because they built from efforts already practiced and explored in the public sector. The framework to achieve innovation (Figure 5) allows the benefits of design thinking methods to be realized in the public sector without completely dismantling current ways of working.

Figure 5- Public Sector & Design Thinking Integrative Practices



The next section will look at two case studies to better understand how the integrative practices identified in the previous section can be applied when addressing wicked problems. The Australian Centre for Social Innovation, Family by Family project and the Hennepin County Water Governance project were selected because they used strategies from both the public sector and design thinking to tackle public wicked problems. The analysis below will compare how each of these integrative practices (See Figure 5) is exhibited, if at all, in the case studies and what results it achieved. The cross-case comparison will demonstrate different ways to apply the strategies that integrate design thinking and public sector practices.

CASE STUDY A- *THE AUSTRALIAN CENTRE FOR SOCIAL INNOVATION- FAMILY BY FAMILY PROJECT*[1]

The Australian Centre for Social Innovation (TACSI) is a not for profit organization, in Adelaide, Australia, that exists to develop innovative ideas and methods that create positive social change. They turn "bold ideas into better lives." Founded in 2009 with seed money from the South Australian government, this social innovation laboratory uses design thinking methods to address unmet social needs, including caring for the elderly, improving educational outcomes, and helping vulnerable families succeed. They set out to create radical solutions that go beyond basic needs and help people have thriving lives, where they can actively develop their aspirations, capabilities, relationships and achievements.

To accomplish this, TACSI uses a problem solving approach they call Radical Redesign. Radical Redesign offers ways of working that are networked and distributed, built on relationships instead of transactions between organizations and focus on what people want. They draw on skills and tools from design, social science, business and policy development to understand the problem and develop solutions that enhance and improve existing behaviors. The approach consists of seven stages (See Figure 6), reflective of the broad design thinking process described earlier in this paper. Each stage begins with a question focusing on what people want before answering what the policy and systems need to look like. This prevents the system or policies from dictating how people should behave.

[1] Information on TACSI and the Family by Family case study retrieved from a website and several supplemental documents created by TACSI. They can be found at www.tacsi.org.au

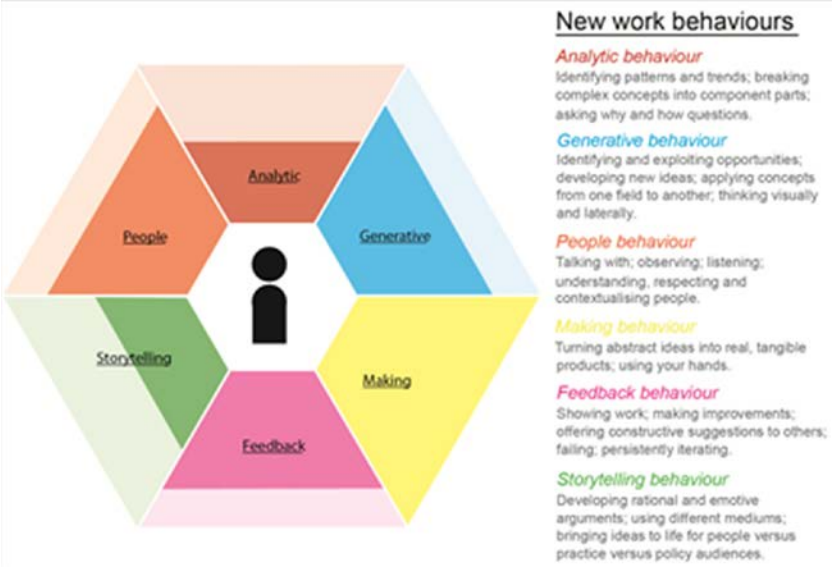
Figure 6- TACSI Radical Redesign Approach

Key to this problem solving approach is recognizing what is being designed. Rather than designing processes or rules and seeing what type of experiences they produce, the TACSI Radical Redesign team designs series of interactions and experiences exhibited as principles, platforms, organizational models, and programs to promote behaviors desired by the users. TACSI defines interactions as "the back-and-forth actions between people, and between people and things". In developing solutions, the Radical Redesign team considers interactions at three different scales: user level, organizational level, ecosystem level. User level interactions shape people's behaviors and define what they are capable of and the relationships they form. Organizational level interactions are policies or platforms that support the user level interactions. Lastly, ecosystem level interactions occur between funders, partners, and policymakers to sustain and spread user level organizations in the external environment. Through all stages of the process, the Radical Redesign team moves back and forth from one scale to another, making adjustments to ideas as new recognitions are gathered about the interactions.

TACSI has identified six work behaviors, drawn from a range of disciplines: design, social science, community development, and business, necessary to successfully use the Radical Redesign approach. They refer to them as people, analytical, generative, making, feedback, and storytelling behaviors (See Figure 7). These behaviors are used in various combinations and capacities depending on the stage of the approach. For example, in the 'Look and Listen' stage, people and analytic behaviors are very important, whereas the making behavior is only needed to create communication materials. However, the create stage relies heavily on making behaviors to develop ideas into tangible experiences.

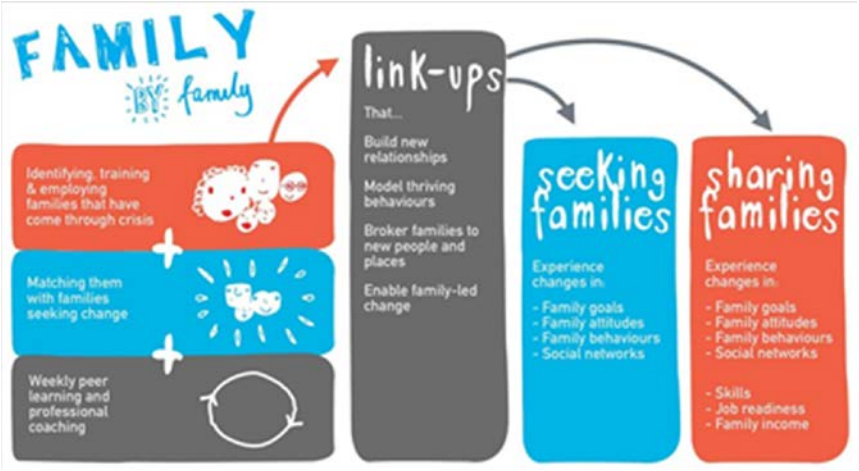
To support the notion of an interdisciplinary team, TACSI expects that everyone on the team learns and employs all six behaviors regardless of their background or expertise. All team members work together to maximize the potential of these behaviors.

Figure 7- TACSI Work Behaviors



TACSI first applied the Radical Redesign approach to the challenge of reducing the number of South Australian families coming into contact with family crisis services. The result was a program called Family by Family that intervened before the crisis point and provided families with opportunities not only to survive, but also thrive. The Family by Family program is a network of families helping families (See Figure 8). The program pairs families who have successfully overcome tough times with families who want to change and improve their live. This program is distinct because it focuses on the whole family not just the parents or children like the existing family services. In addition, it uses families who have come out of crisis situations as primary deliverer of services instead of professionals. The professionals serve in a behind-the-scene role, as coaches who motivate, guide, and support the families. This model helps the program be sustainable because as more struggling families begin to thrive and succeed, the more families who are available to deliver services. The next sections

Figure 8- Family by Family Program



will look at how the user centered, collaboration, and creative thinking practices of the Radical Redesign Approach were influential in creating a successful Family by Family program.

CASE STUDY B- *HENNEPIN COUNTY SURFACE WATER GOVERNANCE PROJECT*[2]

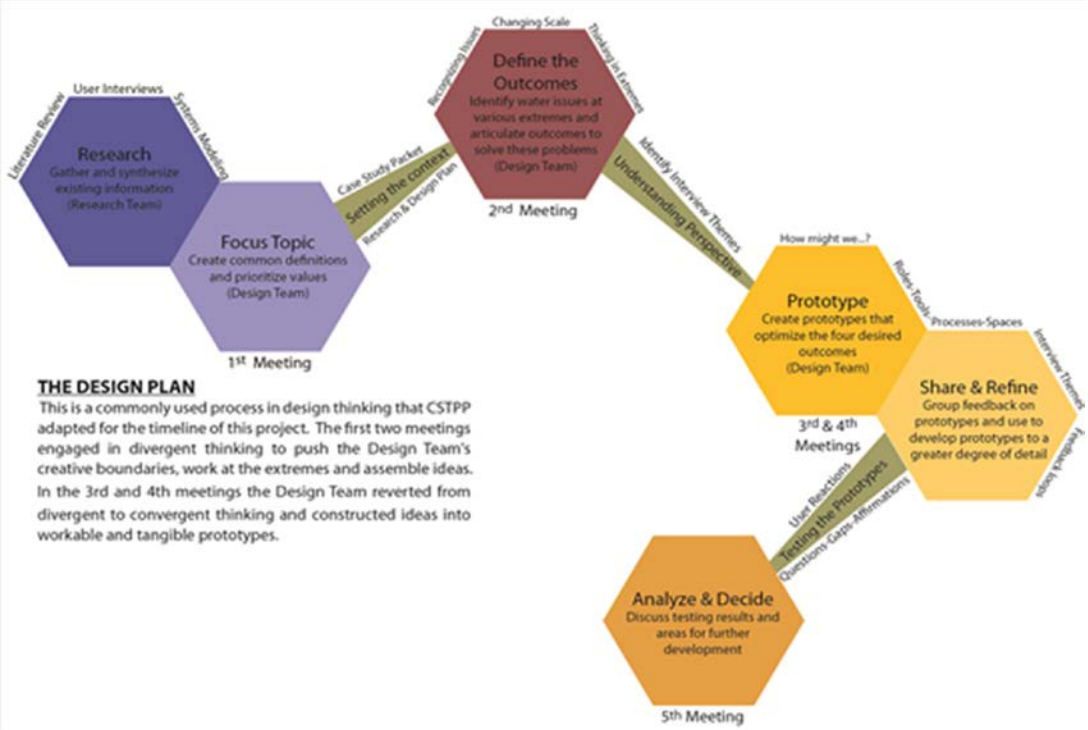
Hennepin County, Minnesota wished to evaluate and redesign its surface water governance system. With eleven different watershed organizations, each having their own rules and regulations, managing lakes, ponds, rivers, streams, wetlands, and rain/snow run-off in 45 cities, the system was comprised of many moving parts all addressing various water issues. Over the past 150 years issues around water management have included clean water provision, flood prevention and control, and water quality improvements. As these societal values and needs have evolved, the system responded by adding more practices, methods, and policies on top of old ones in order to address the new concerns. Additional tensions exist because the natural, hydrological boundaries of water do not align with the man-made political boundaries. Watershed organizations were created to manage hydrological needs that crossed city and county boundaries. However, it was challenging for cities that crossed multiple hydrological boundaries because they were required to work with more than one watershed organization. While the system was equipped to address current needs, it was unclear whether or not this system was appropriately designed to address future water problems.

Feeling the system needed reform, the county contracted with The University of Minnesota's Center for Science, Technology and Public Policy (CSTPP) to design a system that would operate efficiently, transparently, and delightfully for all the people and produces wholesome, healthy, sustainable, and delightful lakes, ponds, rivers, streams and wetlands. CSTPP thought the struggles with Hennepin County water governance system were exactly the type of public policy problem that could benefit from a design thinking process because it involved many highly interdependent stakeholders, was situated in an ever changing context, and needed to consider both political and scientific viewpoints. CSTPP adapted

[2] The information for this case study was gathered from the author's own experience as Design Lead on the project and is not published. The final report is a public document and can be found at http://www.hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=46dbed5136414310VgnVCM10000099fe4689RCRD

the design thinking process of inspiration, ideation, and implementation to adequately address this design challenge (See Figure 9).

Figure 9- HCWG Design Plan



Contrary to the TACSI's Radical Redesign approach, which focused on interactions and behaviors, the Hennepin County Water Governance Project attempted to redesign actual system components and policies. The project included two teams, the CSTPP project team and a design team of expert users. The CSTPP project team consisted of individuals not connected to the Hennepin County Water Governance system, with expertise in design, systems modeling, and public policy and had the primary role of gathering the information and inspiration needed to redesign the system, including mapping the current water governance system, finding inspirational precedent examples of other governance systems, and interviewing several users of the current system. This research informed and guided the design team, a group of 15 individuals who brought an array of experiences working both in and with the water governance system in Hennepin County, throughout the ideation stages of the design process.

The work of the two teams resulted in a number of strategic recommendations for the County board to consider when making decisions in regards to the water governance system. The

recommendations include- 1) reorganizing the watershed district borders to accommodate both hydrological and political boundaries, 2) giving all districts taxing authority, 3) strengthening relationships between watershed districts and cities, and 4) establishing an intermediary level of coordination between the state and watershed districts. These recommendations are distinct because they built on the strengths of the existing system rather than starting from scratch, addressed hydrological and political issues collectively, and focused on relationships held between various entities in the system. To understand how the design thinking process was influential in guiding the direction of these recommendations, I will discuss how the project utilized the practices of user-centered, collaboration, and creative thinking.

USER-CENTERED PRACTICES

Employing user-centered practices for the Family by Family and Hennepin County Water Governance (HCWG) projects was essential to understanding the situation and recognizing what was meaningful to the people involved. Without the perspectives of the families, it would have been difficult for the Radical Redesign team to capture and address the diverse needs of the many different types of families in South Australia. The people directly involved with the Hennepin County water governance system were necessary to understand the many informal relationships and procedures that occurred between the system components. The case studies demonstrate how varying the scale of user engagement, gaining professional empathy, and blurring expert and user boundaries enhanced user-centered practices for these projects.

VARYING THE SCALE OF USER ENGAGEMENT. How the users were defined in each case study greatly impacted the direction of the work. The Family by Family program's focus on the whole family is reflective of the Radical Redesign team's decision to define the users in terms of the relationships between family members rather than isolating the perspectives of the individual members. In the beginning of the Hennepin County project, the intent was to improve the relationship between citizens and the water governance system. However as the situation became better articulated, it was evident that the system's internal relationships were also important, thus redefining which users were the center of focus.

The TACSI Radical Redesign team did not limit themselves to only consider families currently needing family support services. They looked for inspiration from all types of families in South Australia. This allowed them to see connections between families who were on the verge of crisis, in crisis, or had survived a crisis. This led to a more effective solution because it incorporated insights from the entire family cycle and considered the influences of what comes before and after rather than isolating the problem to one point in time. A solution that only focused on the families in crisis would be tackling only one aspect of the wicked problem. Also, not applying assumptions about particular types of families helped the team imagine different roles for the users. For example, the team could have assumed that the families who had already overcome a crisis were no longer within the scope of the problem and not completed any ethnographic research on them. However, then they may have never recognized these families as a resource and used them as the primary service deliverers in the Family by Family program.

In the TACSI example, the Radical Redesign team had to work hard to keep the definition of users broad, where as it was the exact opposite with the Hennepin County Water Governance project. This design challenge looked to improve a system that included many different types of users with a wide range of involvement and purpose. To narrow the focus of the project while still capturing the diverse viewpoints, the CSTPP project team and the Hennepin County administration, prior to the project's commencement, analyzed various stakeholders and recruited a design team of expert users they felt adequately represented key organizations and players. While the process of pre-selecting the users may limit the divergent thinking, it was important, given the complexity of the system, that the users on the design team have enough knowledge and experience with the system to make valuable contributions. To bring in additional user perspectives, the CSTPP project team conducted several interviews of stakeholders who were not on the design team and used this information to encourage the design team to think beyond their own personal experiences with the water governance system.

The TACSI Radical Redesign team changed the scale of user participation throughout the design process to ensure the ideas being developed we representative of broader population. In the beginning of their research, TACSI set up tables at supermarkets, malls, and playground and talked to hundreds of families about family stress. From this information, they categorized the families into three groups, and then completed in-depth home studies for 35 families that represented each of those groups. This

research led to several hypotheses about families. The team tested these hypotheses on a larger pool of families by hosting a free family fun day where they could observe the behaviors of over a hundred families. Changing the scope of user participation allowed the Radical Redesign team to complete in-depth analysis and address the needs of the broader audience.

Given the diversity of users affected by the wicked problems being addressed in these case studies, it was important to be intentional about their involvement in the process. Giving the complexity of the HCWG project it was more valuable to limit the user engagement so that the nuances of the system could be more clearly identified. However the micro scale would not have been appropriate for the TACSI Family by Family project because it would isolate the users to one particular moment in time rather than recognizing the changes needs and situations of the families. Understanding that the engagement can vary for different types of stakeholders even within the same project will help the problem solving be more directed and purposeful to the task at hand.

GAINING PROFESSIONAL EMPATHY. In each case study, gaining professional empathy meant different things. The TACSI team was not directly related to the problem so they needed empathy to understand the situation from the outside-in. On the other hand, the HCWG expert user design team was already entrenched in the system being redesigned, so professional empathy would help them understand how their experiences related to or were different from others in the system.

The TACSI team used ethnographic methods to understand the varying perceptions and experiences through the eyes of the different families. They shared meals, spent 250 hours in their homes observing day to day routines, and gave the families an opportunity to simply tell their stories. Rather than just focusing on immediate and existing problems, the TACSI team also engaged families in conversations about ideas of change to understand how their desires were different from the experiences being observed. Because it can be difficult to discuss things one has never experienced or seen, the team used visual prompt cards with suggestions of what families might want to see in the future. They then made some of these new experiences possible for the families with events, such as free family fun days that promoted interactions the families had never had before. From these events, the team was able to gain more insight into the behaviors that might result from different solutions being developed.

The team was not looking to merely describe how things work in the present but to identify latent opportunities to do things differently in the future.

The Hennepin County Water Governance project did not complete any ethnographic research but instead elicited local knowledge from in-depth interviews of over 40 users involved in the HCWG system to develop a deeper understanding of their values and needs. This information was then disseminated to the expert user design team while they were creating system prototypes. The interview questions solicited information about what the users already knew and desired in regards to the water governance system. The interviews did not deliver a deeper level of understanding the user's connection with water and the system that governs it.

The information gained from the interviews could have been more robust if the interviewers focused on people's behaviors when interacting with the system. There were attempts to 'shadow' some of the employees involved in the system, however those opportunities did not become available. The CSTPP project team, conducting the research also could have placed themselves in the center of the system and tried navigate a process in the system such as obtaining a building permit. Completing this level of ethnographic research would have helped articulate the latent and unarticulated needs and desires people had about the water governance system.

Given that the project structure did not allow the design team to engage in the interviews themselves, it was difficult for them to gain a sense of professional empathy. To counter this, the expert users on the design team were asked to share their personal experiences with each other. At the first meeting, each participant had to explain their role and the value it has in the water governance system and tell a story explaining their relationship with water as a natural resource. This helped the design team recognize key components in the system as well as see each other as individual users of the system who may have experiences different from their own. Subsequent meetings provoked the design team to share more of these experiences as they worked in groups and generating ideas that were meaningful to them. The intention of this work was to push them to discover new realities about their own position in the system and to gain a sense of empathy for the other stakeholders involved.

The two case studies demonstrate the importance of gaining professional empathy to create meaningful results for the users. TACSI achieved this through ethnographic research, whereas the

HCGW project solicited experiences of the expert user team. The comparison of these different strategies, I have gathered that ethnographic work may lead more directly to professional empathy; however it is not always feasible. In the case of the HCWG project, where this was not an option, the team could have gained more professional empathy by placing the personal experiences of the design team at the center of the discussion and problem solving process. The important aspect of gaining professional empathy is focusing and magnifying the behaviors and experiences related to the problem rather simply the logistics and processes.

BLURRING THE BOUNDARIES BETWEEN EXPERTS AND USERS. To improve the experiences of the users, both the Family by Family and HCWG project had to change parts of the system that involved experts and professional organizations in addition to users. The projects solicited input from the internal system in order to develop solutions and recommendations that were feasible and practical from a systems perspective as well as met user expectations.

During the Family by Family project's 'Look & Listen' phase, the TACSI Radical Redesign team extensively researched the existing family service providers and organizational networks. In addition they shadowed practitioners from family and child service organizations to experience a day in the life of field workers and see firsthand the services families were receiving. The Radical Redesign team looked for gaps between what the organization was doing and providing and the needs of the families. One important discrepancy they found was that all services were focused on individual family members, a parent or a child, while families talked about their problems as affecting the whole family. The service organizations and the families were not addressing issues from the same perspective.

Throughout their research, the Radical Redesign team continually checked their interpretations and assumptions of the information being gathered. They asked three questions - 1) How is this different from what we know? 2) What could we learn from it? 3) What additional research could this lead to? The Radical Redesign team did not only look to their own observations and experiences to answer these questions, but also those of service providers, practitioners, and policy makers. A 'sounding board,' a multi-organizational network that included academics, existing service providers, governmental agencies and potential funders was created to provide comments, critiques and new opportunities about the teams

insights and ideas. The sounding board helped the team further develop and refine their ideas throughout the project.

The structure of the HCWG project inherently blurred the boundaries between expert and users. Because the design team members were internal to the system, they were the experts on specific components of the system but were also users of the system being redesigned. In addition to their contributions, the CSTPP team conducted in-depth interviews to gather additional knowledge as described earlier. People from all levels within the water governance system from citizens to state-level employees were interviewed. All interviewees regardless of their position and affiliation were asked the same questions about their priorities in regards to water, what measures they use to value water, and desired characteristics in an ideal water governance system. This information was then analyzed and coded together, resulting in themes that represented views from both experts and citizens. When the design team used this information to guide them in developing system prototypes it was presented with no distinction between what different people or organizations wanted, encouraging the design team to generate ideas that benefited the system as whole.

Both case studies worked from the bottom-up and top-down, however this did not always blur the boundaries between expert and user. With the Family by Family project, even though both perspectives were represented and considered, a clear distinction between the two groups remained. The HCWG project, on the other hand, blurred the boundaries by finding similarities between what different stakeholders desired in a water governance system. While removing the boundaries between stakeholders may not always be possible, it is important solicit and incorporate experiences from both groups because solutions will be more effective if they address the needs and values of users and experts.

COLLABORATION PRACTICES

The Family by Family and Water Governance projects required collaboration because the scope of work was beyond what any one entity could accomplish alone. The Radical Redesign team needed multiple ways of analyzing information to decipher the complex needs of diverse families. Agreement about desired outcomes and a future direction of the Hennepin County Water Governance system would

have not been possible without the input and buy-in from multiple entities involved in the system. Both case studies achieved this by using design thinking and public sector collaboration approaches. They demonstrate how diversifying a team based on affiliation and skills, and using co-creation helped address a complex public sector problem.

DIVERSIFYING BY AFFILIATION AND SKILL. The collaboration structures in both the Family by Family and HCWG projects show how difficult it can be to diversify by both organizational affiliation and problem solving skills. Both case studies created and worked between two separate collaborations within their project in order to incorporate multi-organizational and interdisciplinary components.

In the Family by Family project, the Radical Redesign team was an interdisciplinary collaboration comprised of people from fields of design, social service, policy and business, some of whom were previously involved in family and children services. With these disciplines present, the six working behaviors, identified earlier (Figure 7) are accessible to the team. TACSI believes that while a person for a given discipline might be an expert in one particular behavior, teamwork rather than role differentiation is essential to successful radical redesign. For example, this means that the entire team, not just the person with the business background, contributed to the cost-benefit analysis. Over the course of the project, the entire team would learn and use the full set of skills and behaviors enacted by the disciplines to analysis information and transform it into implementable solutions.

The Radical Redesign team gathered information from the organizations involved in the system through members of the sounding board and other service organizations. These experts provided insights about how existing organizations fit into the system and what potential they could bring to the ideas generated by the Radical Redesign team. With this collaborative structure, the Family by Family project had the resources to analyze the problem from multiple disciplinary lenses and understand the roles of various entities within the system.

The HCWG case study also attempted to bring diverse skills and organizations to the project through two different collaborations. The CSTPP team, who primarily managed the project and conducted the research, was more interdisciplinary in nature, comprised of individuals with backgrounds across multiple sectors including design, public health, policy, environmental, and community service.

None of the participants on this team had any direct affiliation with the water governance system. Instead the institutional components of the system were represented on the expert user design team discussed earlier. This multi-organizational collaboration consisted of 15 individuals from the private, public and non-profit sectors and various governmental levels, all who interacted with the existing water governance system in some way. While the participants of the design team were all representatives of specific organizations, they were not limited to that organizations point of view. Rather they were asked to act as individuals with diverse experiences and expertise gained from those organizations. The expert user design team brought a lot of insider information about the nuances of the system and the CSTPP interdisciplinary team possessed diverse skills to process that information.

The cases studies demonstrate how difficult it can be to assembly collaborations that diversify by both affiliation and skill. With both projects there were two separate collaborations to represent the multi-organizational and interdisciplinary perspective, creating a clear distinction between the two types of diversity. This may be due to the rigid boundaries inherent to the current ways of working in the public sector. Efforts should be made to minimize this gap and work collaboratively concurrently with different organizations and disciplines because it can be difficult to transfer the information and ideas from one collaborative to another. However, a cumbersome structure should not inhibit the practice of incorporating both multi-organizational and interdisciplinary perspectives. It is more important to have both perspectives represented, even if through separate collaborations, to help see the wicked problem more completely than not include them at all.

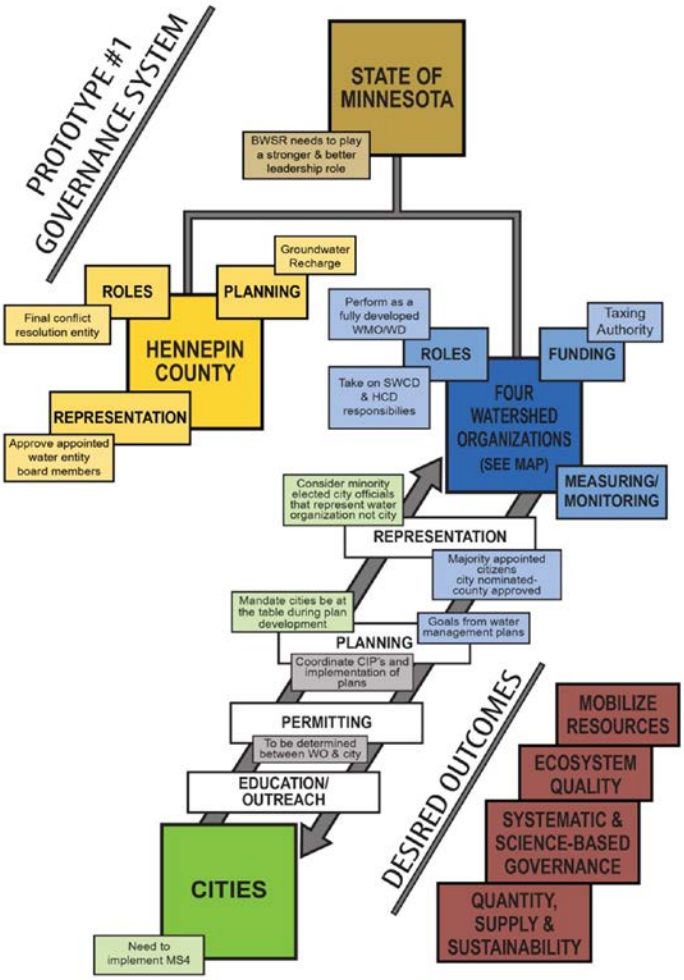
CO-CREATING THROUGHOUT SCOPE OF PROJECT. Both case studies collaborated with users throughout the scope of the project to co-create problem definition, inspirational content and effective solutions. For the TACSI Family by Family project, the users engaged heavily in the inspiration and implementation stages of the design thinking process, whereas the HCWG project relied heavily on the users to establish goals and develop solutions. Each approach helped the project produce solutions and recommendations that were meaningful and feasible for all those involved.

The TACSI Radical Redesign team, during their ethnographic research, asked the users to define the scope of the problem themselves. The initial goal of the project was to create a solution that would

help families overcome stress and thrive rather than simply survive. While the TACSI team decided on this goal, they asked families to define and illustrate what stress and thriving meant to them. Here, the users engaged with the design team to co-create the content that would guide the direction of the project. From this process the Radical Redesign team discovered that families at different stages in their lives defined these terms very differently. Rather than force the project to have one collective goal and vision, the Radical Redesign team grouped families by shared experiences and aspirations and engaged select families from each grouping throughout the development of the program to ensure that most of the diverse needs and values were being met. Without asking the users to define the problem, the collaborative efforts may have been too narrowly focused and missed opportunities to generate ideas that benefited a wider range of users.

The need to accommodate the diverse and changing needs of families would continue well beyond implementation of a solution. To address this challenge, the Radical Redesign team designed a program in which the services delivered were also co-created by the users. When entering the program, families identify for themselves what they want to change and how to change it. They work with the mentoring family and professional coach to establish individual goals and metrics to measure progress. Even the mentoring family discusses what they hope to get out of the experience. The family pairs then decide on activities that will help everyone build capacity. Therefore, any family at any stage in their life can benefit from being a

Figure 10- HCWG Prototype Example



part of this networked program that always connects directly to their needs.

With the HCWG project, the design team of expert users did not partake in the initial research, however, they did play a significant role in defining the problem and scope of the project. The original HCWG contract set the goal of designing a system that operated efficiently, transparently, and delightfully while producing healthy and sustainable water bodies. This goal did not attempt to remedy a current problem in the existing system, but rather allowed the team to develop a shared vision and outcomes they would like to see a system achieve. Establishing a shared vision among the entities in the collaboration was new way of working in the HCWG system. Prior to this project, vision, goals, and strategies were articulated by the individual watershed districts. There was very little coordination between organizations even when one district's actions directly impacted another district downstream. In addition within a single water district, there might be inconsistencies between political and scientific desires. Unifying the entire system under shared goals helped the design team create system prototypes accepted by many different entities because the outcomes were directed by the collective voice of the users themselves, rather than individual organizational goals.

The prototypes and recommendations submitted in the final report were also co-created by the expert user design team. Guided by the shared outcomes described above, the information gathered in the research phase and their own experiences, the team created several system prototypes representing the characteristics they desired in a water governance system (See Figure 10). Designing prototypes helped the expert users convey specific elements and processes that would improve their experience when interacting with the system. The CSTPP project team then used these prototypes to develop concrete recommendations for the county board to consider. These recommendations were well received because they stemmed directly from the contributions of stakeholders in the system.

When co-creating throughout the scope of the project, both case studies were able to keep the project focus centered on the needs of the users. Involving the users in defining the problem and setting goals made their perspective more prevalent as the project teams constantly referred back to the overall vision and focus. In addition, keeping the users involved through project development allowed the TACSI and HCWG teams to realign any new information or ideas with the users' desires. The Family by Family project also allowed the users to co-create the delivery of services to accommodate their ever changing

needs. The HCWG project had users co-create the solutions in order to produce ideas that were most likely to be implemented and accepted by many stakeholders. In both cases co-creating helped maintain a shared vision and direction for the project and minimized discrepancies between diverse needs. No matter which specific aspects of the problem solving are being co-creating, the focus of this practice is to ensure that project remains centered on users' needs and desires.

CREATIVE THINKING PRACTICES

The Family by Family and HCWG project sought to produce ideas and solutions that had never before been applied to these particular wicked problems. The Radical Redesign team needed ideas that did not duplicate existing services in the system. The HCWG project team was seeking ideas that would address unknown, future challenges. To ensure that the ideas generated would be meaningful to the stakeholders and successfully implemented, both project teams stimulated nodes of interaction, analyzed information from different lenses, and refined ideas during implementation.

ESTABLISHING NODES OF INTERACTION. Given the collaborative nature of these case studies, discussed earlier, there were many opportunities to stimulate interactions. In analyzing the case studies, however, it was difficult to discern exactly which interactions contributed to the creative thinking efforts made during the project.

The TACSI documentation makes no mention of intentionally cultivating a creative physical environment. This may be because they spent much of their time out interacting with families in their own settings. The Radical Redesign team visited supermarkets, playgrounds, homes, service agency offices, and others to provide inspiration for the work they were doing. These off-site visits often stimulated group interactions. During the prototyping phase they meet weekly for dinner with several families to hear their feedback on the latest prototypes. Meeting in the group environment helped them quickly assess if the opinions held were shared by only a few or many. The team also set aside dedicated time to step back and analyze all the information gathered thus far. This allowed the information to be viewed through the lenses of many different disciplines and helped draw connections between the ethnographies. By

engaging with the information as a group, the Radical Redesign team had a more complete picture of the problem.

With the HCWG project, much thought was put into stimulating group creativity, however, the project did not take advantage of cultivating a creative physical space. Given various logistics the meetings with the expert user design team changed location each time. This made it difficult to provide a dedicated project space that could inspire the design team. At each meeting though, artifacts from the previous meetings were hung on the wall to remind the team of what they had accomplished thus far. Often throughout the prototyping phase, design team members would walk over and reference the various maps and material posted. This helped bring some continuity to the project since there were several weeks between meetings.

The gap between the meetings also made it difficult to harness the energy gained at one meeting. Each meeting had to rebuild the momentum from the previous meeting. Attempts were made to overcome this challenge by having design team members work in the same small groups each meeting. The groups were carefully selected to ensure that a balanced diversity was present in each group to induce group creativity. People with science based backgrounds were placed with politicians and citizens had to work with high level government representatives. When creating prototypes in these groups, the participants had to align the differences to generate a system prototype that addressed the four shared goals. Looking back on my experience on the HCWG project, it was very difficult to push the expert user design team to think outside of the own perspectives and imagine new connections without a dedicated work space. There were very little visual cues indicating that the participants were there to do a different type of work than normal. The environment and team culture greatly influenced the quality of ideas and solutions generated.

In comparing the nodes of interactions between both case studies, it is evident the project teams understood the positive influence of group interactions. TACSI conducted their work in locations with diverse groups of people and HCWG project included team building as part of the meeting agenda. There was, however, little evidence of which interactions proved to be most influential to inducing creative thinking. In addition, little attention was paid to how the interactions between physical objects also

influenced creative thinking. When establishing nodes of interactions it is important to recognize which factors more positively affect creative efforts and magnify those types of interactions.

ANALYZING INFORMATION WITH DIFFERENT LENSES. The wicked problems being tackled in these case studies are not new to the users dealing with the effects of the problems every day. The nuances of these problems have most likely become so familiar to the users that many of the behaviors occurring in these experiences go unnoticed or unarticulated. Therefore, the Family by Family and the HCWG projects used analogy and visualization techniques to elicit new knowledge and see the problem in a new way

The TACSI Radical Redesign team had the families consider themselves as a business or organization. The families were asked to identify the role individual family members played within the organization, who their 'business' partners were, and create a family motto. They also had each family develop a 5-year business plan to help them imagine new futures. This analogy provided a framework for the Radical Redesign team to use their analytical and linear problem solving skills to compare the diverse families and find similarities and differences between their needs. To better help the families articulate experiences they could not verbally express, the Radical Redesign team asked the families to visually map out their week, identifying high and low points. This forced the families to describe their realities in a new way and eliminated the colloquial social service assessment language. This exercise not only expanded the thinking of the design team, but also gave families a deeper understanding of their situation.

The HCWG project used visualization to compare how people perceived and used the existing system compared to its structural intentions. Each interview participant was asked to draw the relationships between key stakeholders based on their understanding of the system. These maps identified important players, revealed points of confusion and repetition, and illustrated the overlying complexity in the system. This was very helpful for the design team to recognize which components of the existing system might have needed to be strengthened, eliminated, or magnified in order to achieve the shared desired outcomes. Also many geographic maps were used to show the complexity of political and natural boundaries the governance system and water bodies had created. Analyzing these

boundaries visually helped the design team see where the reality did not align with the desired outcomes of an efficient and ecological system. From the maps, the team agreed on regions that could be consolidated to make the system more efficient.

The HCWG project used analogies to help the design team think beyond their current role in the system when generating new ideas for the prototypes. First, design team members brainstormed ideas in small groups while thinking on temporal and spatial extremes, discussing water problems that existed 50 years ago and water problems that will exist 100 years from now for the whole world, for Minnesota and for their neighborhood. Design team members then considered how these things factored into extreme governance systems. Using examples of an authoritarian and a self-governing water governance system, team members imagined a system that achieved their desired goals while incorporating attributes from both extremes. This encouraged the team to push their creative boundaries and consider new options without worrying about the realities of designing a surface water governance system particular to Hennepin County. This was a valuable exercise because very few people on the design team had experience in designing; therefore it was difficult to have them think about the system from an external perspective.

Analyzing the wicked problems found in these case studies through different lenses was beneficial in making sense of the complex situation as well as helping the users provide insightful, useful information. TACSI used analogies as a framework for the families to convey unarticulated ideas about the future that may otherwise been difficult to articulate. In order to see the big picture of the HCWG system, the design team was asked to draw the many components, calling out any gaps of knowledge that wouldn't necessarily be realized. In both cases, these analysis techniques were used to solicit unknown or unarticulated information. When analyzing a problem, use alternative, non-traditional techniques to help define elusive aspects of the problem.

EVALUATING IDEAS THROUGHOUT DEVELOPMENT. The TACSI Radical Redesign team spent many months prototyping different types of programs on various families and service professionals until they arrived at a solution that worked for the largest number of stakeholders. Families were recruited to participate in real-life simulation of different interactions that might become a part of the implemented solution. The

Radical Redesign team observed these experiences to find which ones shifted behaviors towards the outcomes they hoped to achieve. The successful interactions were then storyboarded and tested on service providers to see if they were feasible from a systems perspective. They worked back and forth between the systems and policies and interactions until the program fulfilled the desired outcomes for most families, practitioners, and policymakers.

When testing prototypes, often some parts of an idea would work, while others did not. The Radical Redesign team would learn from the feedback and use it to refine the program. One family member participating in the prototyping phase expressed the satisfaction of being considered during the development,

> "We would say, no we don't agree with this or this is great or maybe change this one a bit. And then they would come back next time [with changes] and they actually paid attention. It was a big deal. I could see my ideas in there." (TASCI, 2011c).

In addition to prototyping the service aspects of the program, the Radical Redesign team prototyped several versions of measurement tools and promotional material. They wanted to be sure the idea could be marketed and grow in the future.

On the HCWG project, the water governance system prototypes created by the design team were reworked internally over several meetings. As the teams created prototypes, their assumptions were challenged as additional information and constraints were gradually communicated to the teams. This information, gathered from the interviews completed by the research team, represented stakeholders' values, desires, and beliefs about water governance systems. Incorporating this information intermittently into the design process, provoked the design team to continually assess their ways of thinking and refine their prototypes as they learned more about the realities of the challenge. After internal feedback and refinement, the prototypes were tested on knowledgeable individuals outside of this design process to gain perspectives. This feedback was used to analyze how these systems might play out in the realities of Hennepin County, if implemented.

The prototyping process not only pushed the creative thinking of the design team, but also made the final recommendations more appealing to the County Commissioners. One Commissioner, during the final presentation, mentioned that he was skeptical because he thought a creative process would produce

radical ideas beyond feasible implementation. He was impressed at how the recommendations informed a new way of thinking about the problem without completely turning the situation on its head. The CSTPP team also used storytelling to convey to the County Commissioners the importance of the recommendations being made. The presentation of the final report began explaining the history of water challenges in the United States over the last century to demonstrate how the water governance systems needed to adapt and realign over the years. Telling this story helped the Commissioners recognize that the need to think about a system which could withstand the challenges of today and the future.

In both case studies, developing ideas throughout the project minimized the risks and obstacles of trying out new ideas because the solutions and recommendations had been tested and evaluated by many users. The prototyping allowed the design teams to see how the overall solution as well as the effects of individual components. When evaluating ideas throughout development it is important to remember to know when to make minor 'tweaks' in the design or 'leap' to a completely new idea.

CASE STUDY CONCLUSION

While each case study applied the integrative strategies differently

The TACSI Family by Family and HCWG project have shown that there are many ways to interpret the integrative strategies introduced in the literature section and the Framework to Achieve Innovation (See Figure 5). The appropriate use and application of these practices will need to be carefully considered for each project. However, the cross-case comparison has revealed several points to consider when working with these new practices. Table X provides a summary of these key takeaways. These points of consideration serve as initial guidelines for incorporating design thinking into public sector problem solving approaches.

Figure 11- Points to Consider when Applying New Integrative Strategies

Integrative Practices	Points of Consideration
User Centered Practices	
Varying scale of engagement	Recognize that stakeholders have different roles at different points in the process
Gaining professional empathy	Focus and magnify behaviors and experiences
Blurring boundaries between expert & users	Incorporate contributions from both types of stakeholder even when boundaries cannot be completely removed
Collaboration Practices	
Diversifying by affiliation & skill	Assemble separate collaborations in order to achieve greater amount of diversity
Co-creating throughout scope of project	Use to maintain project focus around users' needs and desires
Creative Thinking Practices	
Establishing nodes of interactions	Recognize and promote the types of interactions that more positively affect creative efforts
Analyzing through different lenses	Use alternative analysis techniques to define elusive problem areas
Evaluating ideas throughout development	Make modifications that are both 'tweaks' and 'leaps'

DESIGN THINKING LIMITATIONS

This paper argues that the design thinking methods can effectively be integrated into practices currently being pursued by the public sector. While the case studies demonstrated successful implementation of many of the new integrative strategies, the design thinking process does have its limitations when operating in the public sector.

Accountability- With so many stakeholders and decision makers involved in a design thinking process it is difficult to hold people accountable for the results. If particular aspects have dire consequences it could be problematic to find the source of the decision. Also no framework has been developed to guide who has final decision making authority. In applications of design thinking outside the public sector, there is usually a client that initiates the project and takes responsibilities for final decisions and implementation. This client-consultant relationship is not always clear when dealing with public problems.

Evaluation- Currently, there are very few measurement tools to evaluate the effectiveness of the practices used in design thinking. While the satisfaction of the participants can be evaluated, it is difficult to recognize what effect the process will have on their future behaviors. Also, articulating exactly which aspects of the process are working and which are not would be hard to decipher since the practices are often used together. This can also pose problems when organizations are attempting to make their processes more efficient.

Transfer of Skills- The design thinking process asks people to use skills that they may or may not have in new ways. This can be even more challenging when the skills are being applied to complex information. It will take time before the practices of design thinking become natural behaviors in the public sector culture. Until this happens, the organization can employee someone familiar with design thinking methods or work with a design consulting firm. This tactic, however, may not be attractive to some managers because it might require more resources upfront.

Indissoluble boundaries or system components- Design thinking can transcend many boundaries and ways of working, however it does not have the power to remove them all. Some institutional practices, such as legislative procedures, may be so ingrained in the public sector that they pose significant barriers to implementing resolutions outside the norm.

The influence of these limitations can be minimized if they are acknowledged from the outset. They may not be able to be removed, but awareness allows the process to work within their constraints.

CONCLUSION

This paper provides initial research on how to incorporate design thinking methods into the public sector. It analyzes existing theories and practices from both the public sector and design fields to demonstrate how they can be integrated to create a new problem solving approach to addressing wicked problems. The new integrative practices suggested in this paper (See Figure 5) provide a framework for practitioners when employing user-centered, collaboration, and creative thinking practices to produce innovative solutions.

The analysis in this paper only discusses how to do integrate the practices from both the public sector and design thinking. Additional research is needed to assess the effectiveness of using approaches from both fields to address wicked problems. What value is achieved that the public sector

cannot do alone? More in-depth case study analysis would also help articulate to what extent portions of the framework can be implemented and still produce innovative results. Hopefully this paper inspires more public sector practitioners to use design thinking methods so the data is available to pursue these avenues of research

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