

**Design Thinking Collaboration:
Changing How Companies Solve Problems**

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INTRODUCTION

Today, rapidly developing technology is changing the landscape of the labor market in the United States. There is continued pressure from other countries that can produce products more cheaply. Daniel Pink observes that “We must perform work that overseas knowledge workers can’t do cheaper, that computers can’t do faster, and that satisfies the aesthetic, emotional, and spiritual demands of a prosperous time” (61). Technology is taking away many manufacturing jobs as machines are being automated which is impacting the type of jobs and businesses. In the two hundred years since the Industrial Revolution we have moved from a time when manufacturing was the primary work to one that requires knowledge workers. Knowledge workers are people who frequently work in an office setting using computer technology without much physical labor. Technology is changing the type of jobs that are profitable making it necessary for companies to approach problems in a different way. Companies must find innovative ways to solve complex problems; those who fail to change may not survive the transition.

Companies that recognize the need for a workers who can solve complex problems might not know where to find them. Education has long been a primary way that people prepare for a career. In early times, workers served apprenticeships to learn practical skills that could be traded or bartered for other goods and services. As nations industrialized in the nineteenth century, schools developed as places where people could gain the knowledge for a future career to work in factories. Desks were lined in rows with a teacher in the front of the

room providing direction. This arrangement prepared people to work in a line at a factory and listen to supervisors direct them. In the two hundred years since the Industrial Revolution, the type of jobs have changed greatly but the format for delivery of education has not changed much. Many people are still being taught in a manner that prepares them for a type of job that is no longer abundant.

Knowledge workers are needed more than ever but many companies struggle with how to find new talent and use the talent they already have. One way to solve complex problems is to have a group with a variety of knowledge collaborate to develop solutions. Even though many offices with over one hundred employees have processes that involve multiple departments, they do not involve input from each department when making decisions. Involving input from each department can optimize the chance of success of any process improvement, resulting in increased employee job satisfaction, financial growth for the company, and a culture of sharing within the company. Even when leadership can recognize the benefits, it is hard to implement this process when people do not have the skills to collaborate effectively.

One approach that can assist companies in collaboration is design thinking. Design thinking uses a series of steps from design to identify the problem and develop a solution. If one step is overlooked, the process is not likely to be successful. The step-by-step process helps groups stay on task and gives participants in the project specific goals and roles. It is an iterative process that involves the users throughout to make sure that the needs are being met. Failure

can be viewed as a positive result because what is learned from failure creates a better product. The process is something that can be learned and improved with practice. Design thinking can cultivate skills for developing solutions to problems.

Some companies may argue that collaboration is not always a good thing and I would agree that can be true. When done without the right guidelines, collaboration can waste time and create a negative culture in the company. The use of an approach like design thinking that has a step-by-step process addresses many of the problems that develop when working in groups. It can bypass people's egos and personalities because there is a sequence of steps to follow so it gives the group a way to keep people focused on the task and not their personal feelings regarding each other. The design thinking approach requires that participants have training on the process to develop skills for each step in the process.

Working in the education field at the University of Minnesota, I have found there is already a widening gap between the skills needed in business and the types of training provided. The top skills that employers require are often not addressed in current curriculum leaving many open jobs unfilled. Employers need people who can work together to solve complex problems and are not finding those skills in current or future employees. Critical thinking and problem solving are two of the skills that our college receives requests for training for even highly educated individuals. Employers, educators, and employees are invested in addressing the skill gap and design thinking is one method that can be used to provide the skills that meet the needs of all.

Design thinking is not the solution for every type of work environment, but it has had success in offices. This study will focus on companies with an office environment that are already collaborating using the design thinking method. Although there are several Minnesota companies trying to use design thinking collaborations, most are not doing it well or are having issues getting started. What can companies learn from case studies on design thinking collaborations between departments to solve complex problems? This paper explores how design thinking can be used for collaboration, and how using the design thinking approach will affect employees and the company. The study investigates the when, where, and how these collaborations can take place in companies. Because the approach can create change in the interactions and environment, I observed the companies from an *organization development perspective*. This perspective gave me insight into how design thinking creates changes in the culture, climate, and strategies of the organization.

Most companies' culture, climate, and strategies are greatly influenced by the leadership. Support of leadership would be necessary to start using an approach across the whole company. The results of exploring how companies are establishing measurements for success in order to gain support for a design thinking approach will provide others with the necessary evidence management requires to see the benefits of an investment of time and money. The exploration of the methods that current companies are using to implement the design thinking process will give insight into what investments it takes to get the most

successful results. The results will then show the impact of the process on the people, and the culture, of the company.

Using an approach to collaborate like design thinking can create immediate changes to the culture of the company and how people work together, but there are larger consequences that need to be examined. What are the future implications of using design thinking for increased collaboration on employee skillsets and available resources? I argue that the iterative nature of the design thinking approach and the emphasis on a sequence of steps that involve the users' feedback makes it an effective approach for companies to collaborate to solve complex problems in office environments. Furthermore, I claim that employees will need to have or develop specific skills that support design thinking and companies will need to provide specific resources for these collaborations.

This paper will define the process of design thinking, give examples of users, and define how some companies are attempting to measure success. I will also discuss how collaboration and innovation are related to the approach of design thinking. Additionally, this paper will then review the results of case studies on three local companies that are using design thinking to increase collaboration between departments. Based on the findings from the case studies, I will recommend ways to use design thinking in collaborations between departments based on the findings. Finally, I will conclude with the implications of using a design thinking approach on employee skills and company resources.

The use of design thinking to solve problems is fairly new in the office environment and this paper may provide a starting point for companies to become more familiar with how they might use it. The recommendations can guide them on what resources they need to create a supportive environment that promotes the use of the approach. The study can also be a resource for educators and students to identify the skills that are needed. The skills needed for design thinking can guide the changes that will need to be integrated into education to prepare employees to excel at design thinking collaborations.

PART 1: THE DESIGN THINKING PROCESS

CHAPTER 1: DEFINITION

Before bringing design thinking into an office environment, leadership and employees must have an understanding of the principles for the process of design. The process of design can be defined in various ways, but all definitions reflect the same idea of the iterative nature of the design process and recognize the benefits that can come from failure. The desired result of design thinking is to change what is not currently working into something that meets the user's needs and improves the experience. For this paper, I will use the elements of empathize, define, ideate, prototype, and test as the steps for the design process ("Use Our Methods").

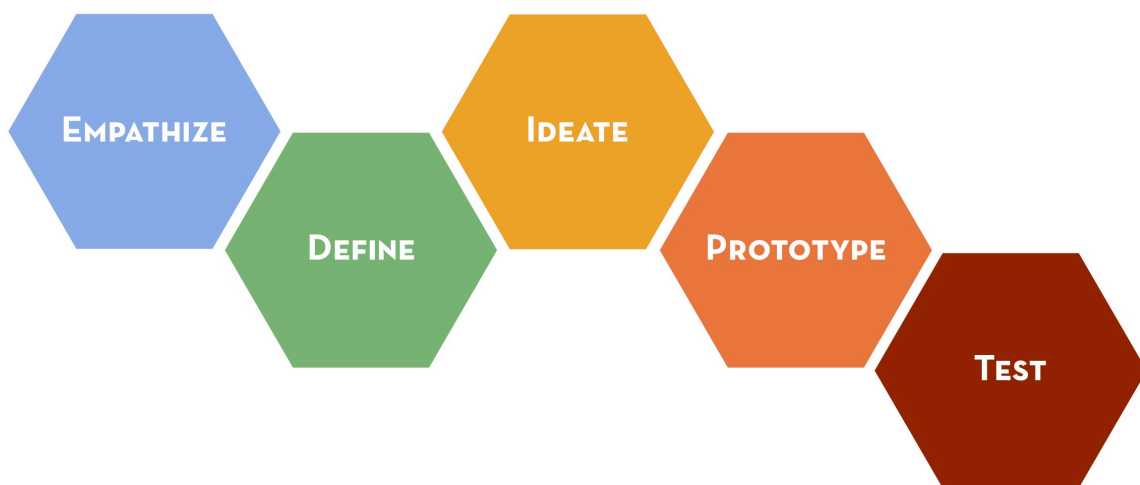


Figure 1. Steps in the design thinking approach ("Use Our Methods")

EMPATHIZE AND DEFINE

The first step of a design is for the designer to empathize with the users to understand their needs and wants. The users may not realize that their perception of what the problem is, differs from the actual problem. The designer can discover the problem by asking questions and researching the product or topic. Some people from scientific fields may resist the approach of design thinking because they feel that design is completely subjectively based on intuition, feelings, and creativity with no basis in scientific knowledge. When done right, design thinking combines subjective knowledge with objective knowledge to find innovative solutions. Jill Pable discusses the importance of using objective knowledge, or evidence, in conjunction with subjective knowledge to help legitimize design (v-xx). Although she is mostly referring to interior design, her ideas reflect a common theme across all design disciplines: that evidence is essential for creating the best solutions. “Within the design academy, most agree that objective knowledge is made most useful when accompanied by subjective ways of knowing that inject generative, creative, and sometimes intuitive decision making to the decision-making process” (Pable ix). Empathizing with the users and then gathering the scientific evidence to support the defined problem gives credibility and makes it easier to get acceptance from the stakeholders.

IDEATE

Once the problem is defined, the team can start generating ideas on how to achieve the best solution. Although ideation can be done alone, it really excels when done in collaboration with a team. Companies have an immense amount of talent and ideas at their disposal, but lack

awareness of how to bring together staff members to solve problems in the workplace. Figuring out how to communicate within a team can determine the odds of success for a project. Lindberg, Noweski, and Meinel discuss how “some form of overarching communication is needed that helps team members in multi-professional projects to develop a mutual understanding in order to integrate what would otherwise remain splinters of knowledge” (35). Each person has an area of specialized knowledge and when combined with other people’s knowledge, the group has a more comprehensive view of the problem and possible solutions. Collaboration can be particularly helpful in the ideation phase of the design process if the team is provided with the tools and resources to work together.

PROTOTYPE AND TEST

Once ideas have been generated, prototyping can take place to figure out which of the ideas will yield the best results. The proposed solution can then be tested to determine its effectiveness and what changes need to be made to improve it. If failure occurs, the group uses it as a learning experience to inform future designs. Initial failures can cost time and money but can also lead to solutions that will recover the initial investment and more. It can be hard to prove to stakeholders that failure can inspire a solution that could one day save millions of dollars. Tim Brown demonstrates this example when he refers to Spencer Silver’s discovery of the glue for post-it notes (81). The glue was discovered accidentally when working on a project and was discounted as a failure since it was not apparent that it could serve a purpose. That mistake turned into one of 3M’s most valuable products and has earned billions for them.

THE APPROACH OF DESIGN THINKING

The approach of design thinking has many benefits: it uses the iterative nature of the design process, failure is not feared and is utilized to develop even better solutions in the next iteration, and the approach can be taught to all employees regardless of artistic ability. The collaborative nature of design thinking can assist companies in guiding their departments to work together to find the best solution in improving processes and products. Employees may be resistant to the approach because it sounds like something that would require an artistic talent. By categorizing themselves as either creative or logical, people think their predisposition determines the type of work they are capable of doing. Daniel Pink describes people as being either right-brained, (creative and emotional) or left-brained, (analytical and logical). Pink argues that the combination of both sides will yield the best solutions (1 – 50). The combination of evidence and creativity can develop solutions that exceed the user's expectations.

Knowing how to use the design process is not an innate talent that one is born with; rather, it is a skill that can be learned and developed with practice. Some people may be more adept at using the design process, but everyone can learn how to use it. Solving today's problems takes a different kind of thinking from the kind companies have used in the past. "For businesses, it's no longer enough to create a product that's reasonably priced and adequately functional. It must also be beautiful, unique, and meaningful" (Pink 33). Pink argues that businesses need to be open to new ways of approaching problems or they will not survive in the rapidly changing economy. Pink, and many others, support the use of design thinking as a

way to stay competitive in an economy that has been shaped by the rapid advancement of technology.

Warren Berger (39) and Tim Brown (27) discuss how changing market needs have created a demand for people that specialize in one area and then can branch out into other knowledge areas. They refer to these people as T-shaped in reference to the shape of the letter “t”: one’s specialization being the vertical base, and the ability to branch out being the horizontal line. This is the type of people that will be in high demand due to their versatility and ability to learn about multiple areas. They are the type of people that can excel at working in teams and using approaches like design thinking to promote innovation (Brown 26 – 34).

Companies are seeing the need to address complex problems in new and innovative ways. Design thinking is proving to be one of the tools that management is accepting as a strategy to collaborate to solve problems. Design thinking does not come without concerns to its staying power. Rachel Cooper, Sabine Junginger and Thomas Lockwood (50) discuss the appeal of using design as a tool, but warn that it could be a flavor of the month if not established correctly. They explain that design thinking addresses the organizational structure of a company, referring to the company’s values, norms, and beliefs. The culture of the company and the support of management can largely influence the longevity and usefulness of the process (51). The authors assert that:

The imperative now is for business schools and design schools alike to open new paths for students to acquire design skills that allow them to think through

design. This involves the ability to quickly visualize problems and concepts, the development of people-based scenarios, and the design of business strategies based on design research. (53)

They suggest that the place to start preparing people for using desing thinking is in schools and some schools have already started preparing their students.

CHAPTER 2: CURRENT DESIGN THINKING USERS

Based on a demand for innovative approaches to problem solving, design thinking has been used in schools and businesses throughout the country. Design thinking uses the skills and talents that people already have. It provides employees with the outlet to apply their vast areas of knowledge to complex issues outside of their own departments. A company may have previously hired external consultants when they encountered a problem, but the design thinking approach can show where they have these skills internally. Using current employees can save money by utilizing the employees' previous knowledge and skills. Employees might benefit by finding more satisfaction in their jobs when they are allowed to contribute in new ways.

Design thinking rarely happens on its own; education and training are needed to have successful and productive collaboration on projects. There are schools that have recognized this need and implemented it into their programs. Schools have been leaders in using design thinking by partnering with various agencies to solve problems for real world projects. Schools have great success with these types of collaborations because the benefits for the organization and the school are easy to identify and grants and funding can often be found to supplement the costs. Students gain from working with experts in businesses and community organizations by learning from their insights and knowledge as well as building skills in teamwork and communication. Businesses gain from the solutions that are developed for their problems, and have the opportunity to meet with potential new recruits and advocates for their company.

STANFORD D.SCHOOL

Stanford d.school is a well-known school that has been successful in preparing students for using the design thinking approach and is a good example for others to imitate. The d.school has been using design thinking to teach students of various ages and professional backgrounds regardless of admittance to any particular college program. They use the design process to work on real world projects in partnership with non-profit, government and corporate agencies. The school characterizes itself: “Our culture of collaboration means we move quickly beyond the obvious ideas. We help each other even if it is inconvenient. We ask for inspiration when stuck. We play. And we defer judgment long enough to build on each other’s ideas” (“Our Point of View”).

The school does not offer a degree upon completion; rather it provides supplementary classes for any student to apply to his or her degree and allows people of all ages and disciplines to learn from each other in a collaborative environment. It is meant to improve the quality of education for all students regardless of their focus of study. These partnerships also benefit businesses and the communities through the solutions the students develop in their projects. This gives students the opportunity to learn from a variety of industries and build relationships with other students and businesses (that may lead to future opportunities) and build upon skills that may be needed in the changing market (“Our Point of View”).

The d.school has used many types of design thinking training for students and companies. One training plan that has been used in the corporate sector is three full days in

length, and facilitated by a qualified trainer (Fig. 2). Figure 2 could be an example of the type of training program that a consultant could bring in to train their employees. The teams work together on a sample problem and develop solutions using design thinking. Each day the team learns how to work through different parts of the design process: empathize, define, ideate, prototype, and test. The last day participants debrief and find ways to implement the approach into work projects. This is when the teams develop action plans for how they can use design thinking on future projects. The d.school's work is just one example of how schools are informing the knowledge of new graduates and providing training to working professionals.

d.school Design Thinking Bootcamp

d.school (Bldg 550)

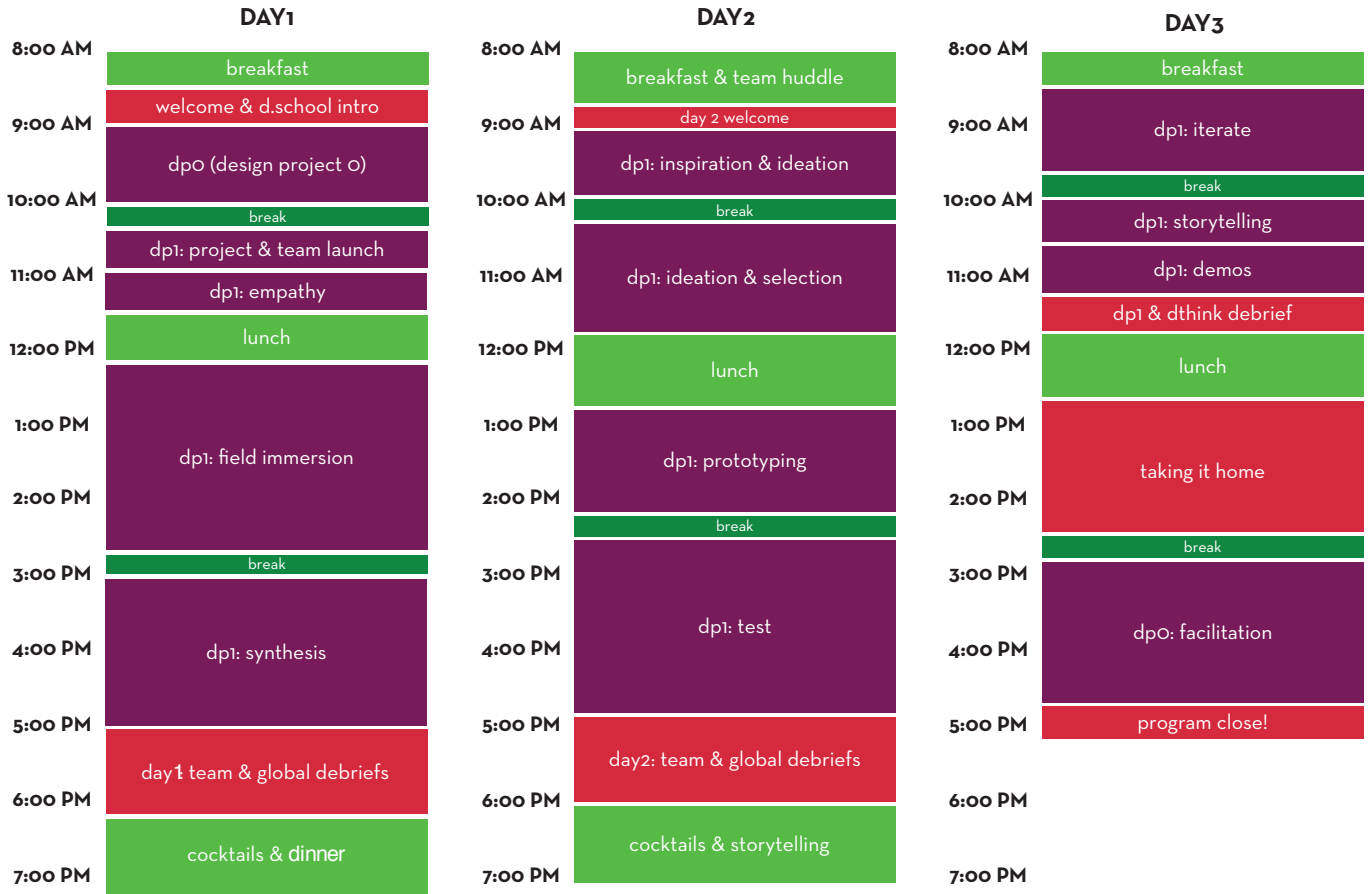


Figure 2. Sample schedule of design thinking training at Stanford d.school. (“Sample Schedule”)

COMPANIES

Some companies may not want to invest the time into training their employees and may want to hire a consulting company that specializes in collaborative projects using design thinking. It can be overwhelming to try to implement design thinking if no one in the company has ever done it before so some companies prefer to bring in consultants. Bringing in an

external consultant can make the process go more smoothly and he or she can mediate between stakeholders without having an agenda. IDEO is one company that has worked with many renowned organizations using design thinking to solve problems. IDEO believes in a human-centered approach that focuses on having empathy for the user to solve problems. Tim Brown discusses his experience of using design thinking to solve problems in his work at IDEO, saying that design thinking gives companies the ability to “put these tools into the hands of people who may have never thought of themselves as designers and apply them to a vastly greater range of problems” (4).

An outstanding example of a design thinking project is IDEO’s work with Kaiser Permanente to develop a new process for the shift changes at hospitals. Kaiser Permanente was losing hundreds of thousands of dollars every year due to the mistakes and wasted time that was being spent by nurses and doctors whenever a shift changed. They had to meet together in the hallway and discuss all the patients that were being transferred over to the next nurse. By working with “a strategist with a nursing background, a specialist in organization development, a technology expert, a process designer, and a union representative, facilitated by designers from IDEO” (Brown 172), the hospital was able to develop a new process and find software that would assist nurses with improving shift changes. The information that they would have gotten by meeting with each other in the hallway between shifts was now accessed through the new technology at the patients bedside. The process and technology helped to cut the amount of time nurses spent transitioning between shifts and optimized exchange of

patient information. The solution not only addressed the financial losses but also made the user experience better for everyone by minimizing mistakes and reducing the repetitive questions to the patients.

One of the biggest reasons for the success of the IDEO project was the collaboration of a variety of experts in various fields, observing and working with the users. IDEO's designers facilitated the design process, which allowed them the flexibility to test, refine, and implement the new software and procedures without the pressures of trying to be perfect the first time. The result was happier patients and employees, and an ultimate savings of time and money. Kaiser Permanente was able to recognize that the initial investment of time and money into making these improvements would pay off in the long run in terms of patient and employee satisfaction and financial savings (Brown 172 - 73). This is not always an easy concept for organizations to grasp, and It can be hard to find the support from those who make financial decisions.

CHAPTER 3: MEASURING SUCCESS

Most companies are driven by profit and financial gains so leadership needs to know there will be positive outcomes if they invest in a project, but measuring success can be the hardest part of implementing design thinking. Most companies are new to using the process and often do not establish measurements before the change is implemented. Having a baseline measurement before the start of the process provides data for comparison. The perceptions of the employees can be important too, but are often a secondary consideration for leadership. The measure of finances remains one of the most important ways for leadership to measure success. The ability to demonstrate positive results to leadership can often determine if the change will be adopted and become part of the culture of the company.

Brian Leavy conducted a study on Proctor & Gamble and their effort to create a design thinking culture of collaboration in their company. He discusses the success of the project and credits the company's financial success to the innovation that comes from using the design thinking approach. In 2001, the CEO, A.G. Lafley, appointed their first-ever Vice President for Design Strategy and Innovation. Her task was to integrate the use of design thinking into the culture. She worked to develop a plan and over several years, they were able to implement the strategy. The company clarified expectations in a written contract for leadership, recognized that it would take time to adopt, hired experienced talent, collaborated between teams, had leadership positions attend a five-day training on design thinking, and hosted a training

program for all employees of Proctor & Gamble worldwide (Leavy 5-14). These factors contributed to how effective the company viewed the change.

Design thinking cannot be proven the only factor in the company's financial gains and Leavy's study did not identify the specific financial measurements before the use of design thinking. Employees did note that they felt increased satisfaction in their jobs, which can also be considered a positive result of the project's success. The company created a culture and climate that uses the approach of design thinking to develop innovative solutions. The culture of innovation has helped the company stay competitive by leading in the development of new ideas and keeping their products fresh and desirable for consumers. The experience of Proctor & Gamble supports the use of design thinking as an approach to spark innovation throughout all departments within a company in an office environment.

Maarten Cuijpers, Guenter Hannes, and Katrin Hussinger (565 - 75) studied companies in manufacturing and technical fields to find the costs of inter-departmental collaborations and the best methods of measurement. The study suggested that the cost of using a design thinking approach can be measured by comparing the percentage of sales, percentage of cost reductions, financial losses due to project delays or terminations, cost of employee time spent on a project, and money invested into research and development. These are all financial measures that can yield quantitative results, but the results of their study showed that financial success is not the only important factor for a company; the satisfaction of employees is also

critical to building a thriving corporate culture. Innovation requires people to work on the projects and finances cannot be the only measurement.

Similar financial measurements were found by Keith Smith as ways to measure innovation in manufacturing companies, although he concluded that the financial measures did not account for other aspects of innovation (sec. 6.6). The critical thinking, problem solving, and learning parts of innovation cannot be measured by financial statistics. They require an approach that reflects the perceptions and opinions of the people. These studies show how a survey or interview can better gather information regarding the experiences of employees. Although financial measurements are important, the combination of multiple types of measurement can give a more holistic view of the success of the project for both the company and its employees.

All of the previous studies have referred to the importance of employee interaction and engagement as important measurements. Diane Sonnenwald and Leach Lievrouw conducted a study on a design team at a technology firm to measure collaboration during the process of completing a project (179 - 204). They conducted initial interviews of the participants and then used a series of surveys that used the Likert scale for self-ratings. The participants were of various years of professional experience, a variety of educational backgrounds from bachelor to Ph.D. degrees, and were from many different professional fields. A project leader at the company suggested that the best way to measure the success of the project was by the ability of employees to meet deadlines and commitments, and the absence of major errors in the

finished project. These comments were reflected in the survey questions as well as measures of employee satisfaction and leadership support (Fig. 3).

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I received appropriate recognition for my accomplishments from team members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Group members are satisfied being part of this team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. There is little cohesiveness or group spirit in our team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The team is effective at meeting individual group member needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Our team's overall performance meets my boss' expectations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Team goals are congruent with organization goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. It is often hard to figure out just what management expects in terms of our team's performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The idea and concerns of our team are understood by higher levels in the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Our team receives appropriate recognition for our accomplishments from upper management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Our team is considered a top performing team throughout the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. It is easy for team members to gain the cooperation of others in the company who can assist the team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Technical solutions created by the team are innovative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. The team's design and development process is efficient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. The team achieves its goals on time and within budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. This is a top performing team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. There is high customer demand for the product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Product will meet company's expectations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 3. Survey that was given to study participants. (Sonnenwald and Lievrouw 191)

The findings showed that the number of team members each person had contact with was correlated to the participant's perceived performance of themselves and others. It showed that the more team members interacted, the more innovative solutions the team developed. The study also showed that, the way that team members communicated with each other was dependent on personality, the task, and their knowledge or profession. Overall, it demonstrated a link between communication and the performance of the team. This study illustrated that using a collaborative approach to the way that team members communicate on a project could enhance the performance of the team and generate innovative ideas.

PART 2: COLLABORATION AND INNOVATION

CHAPTER 4: COLLABORATION CHALLENGES

BUILDING TRUST

Design thinking is a collaborative approach that can be used to develop innovative ideas for problems, but can be hard to implement without providing measurements. Although measuring results is difficult, it is not the only challenge for companies. Creating a culture of collaboration can determine the success of lasting use of design thinking. One reason collaboration is difficult is that employees have to change from a mindset of competition to collaboration. Some employees may not want to work with other departments for fear that they will lose their jobs or changes will be made without considerations to how it will affect their processes. There needs to be trust built between team members for collaborations to have success. Pamela Eddy did a study on several institutions collaborating in Ireland to solve complex social issues regarding education. In Eddy's study, it was found that:

First, the type of motivation for partnering contributed to the alignment of values and mission among partners. Second, the role of an internal champion for the partnership made a difference. Third, the partnerships had impacts on individual institutional operations and ultimately on faculty work. Finally, the external context influenced outcomes (24 - 25).

All these factors contributed to the feelings that the participants had toward each other and the project, which influenced any successes or failures.

One of the biggest contributors to the success of the institutional collaboration project was having a champion or group mediator/leader who could deal with disagreements and help the contributors to get along. Having someone who has an external perspective and has no allegiances to anyone can be critical in building trust between any partners. Trust is also built by agreeing on a goal that can be measured to determine the effectiveness of the project. Eddy argues that the results of a project need to be measurable in order to prove the value of the endeavor and to get buy-in from all participants to work toward the common goal (19 - 29). The participants in this project were required to commit to a common goal in order to become a partner and work on the project, but that did not mean that they always agreed on the best solution. The projects had varying degrees of success but the study showed what factors created ideal conditions for collaborating between groups. Finding a way to facilitate the conversations and encourage communication emerged as key factors (Eddy 19 - 29).

PERSONALITY TYPES AND SKILLS

Developing trust is hard, and can be even more challenging when working with different personality types and skills. People have different talents and collaboration can be easier if roles and tasks are defined using those talents. Tom Kelley (1 - 273) refers to these personas as the *ten faces of innovation*: the anthropologist, the experimenter, the cross-pollinator, the hurdler, the collaborator, the director, the experience architect, the set designer, the caregiver,

and the storyteller (Fig. 4). For example, the design thinking process requires a director and set designer to provide the guidance and tools for the project, an anthropologist and caregiver to empathize with the user, a collaborator to define the problem, an experience architect, hurdler, and cross-pollinator to ideate, an experimenter to test prototypes, and a storyteller to communicate the results to the stakeholders. Each person can play one or more of these roles in the design process, but they are all needed to develop an innovative solution. Although people may have an aptitude for certain personas, it is important that employees learn how to function in any role.

Anthropologist	Excels at human observation and research
Experimenter	Tests ideas through trial and error
Cross-Pollinator	Finds ideas from other industries and cultures
Hurdler	Finds a way around obstacles
Collaborator	Brings groups together
Director	Helps select and guide the team
Experience Architect	Considers the experience of the user
Set Designer	Creates an environment for teams to work
Caregiver	Knows the customer’s needs before they do
Storyteller	Communicates within and outside of the company

Figure 4. Description of Ten Faces of Innovation. (Kelley 1-273)

Each project that uses the design thinking approach requires that someone play each role and be an advocate for that area in the design process. When each role is represented, the collaboration is more likely to develop an effective solution. All of these personas serve a purpose in problem solving and reinforce the importance of collaboration. Most of us do not go through the day without having to work with other people so we should expect that problem solving should take that same collaboration. "People make it happen through their imagination, willpower, and perseverance. In addition, whether you are a team member, a group leader, or an executive, your only real path to innovation is through people. You can't really do it alone" (Kelley 6).

MYTHS

Resistance to collaborate in a company can come from the misconceptions about what it means to collaborate. Leigh Thompson discusses the myths and assumptions that people can make about working in teams. Some of these myths are that teams are always more creative than individuals are, teams perform better when there are no rules, and quality of ideas is better than quantity. If teams do not have the right guidance they can perform poorly; they need rules and the freedom to generate lots of ideas regardless of feasibility. She suggests that assigning roles and rules, keeping small but diverse teams, and choosing a leader can improve the odds of a successful collaboration. She also discusses a study on the importance of providing training to employees on how to collaborate for the purpose of generating and

selecting ideas. “The groups who had been trained in idea generation brainstormed more ideas and more original ideas than did groups who simply practice without training” (Thompson 158).

Another myth is that collaboration is always the right thing to do. Richard Longoria discusses the importance of mutual understanding of what collaboration means to the stakeholders. Stakeholders can enter into collaboration with unrealistic expectations. A common expectation is that it will be “a cost saving measure, inexpensive, free, and or a folksy plea for ‘the right thing to do’ ” (Longoria 133). Collaboration takes an investment of money and time by everyone involved for it to produce a positive outcome. When entering into a project under faulty assumptions, it is not likely that the results are going to match up the initial expectations. Longoria (128 - 38) argues that any outcome should be measurable in order for the stakeholders to see the value they are getting from the investment of time and resources. This can prevent any misunderstanding about the purpose for the collaboration and provide clearer goals for the project.

CHAPTER 5: INNOVATION

INTRODUCTION

The purpose of using a collaborative approach like design thinking is to develop innovative solutions. Since innovation is often the result of using design thinking, it can help to determine how to define it. David Hailey, Matthew Cox and Emily Loader define innovation as using the step-by-step structure of engineering design techniques. They emphasize that everyone is capable of innovation, not only people who define themselves as creative. “Creativity is not, itself, a talent. It represents combinations of talents and skills that come together in complex ways” (129 - 30). Innovation is a process that takes teamwork and communication at each step. Each step affects the next one and the project will not be successful unless there is a plan for implementation. Therefore, there must be communication throughout the whole process. “An innovation therefore, is not an innovation until it has been adopted” (Hailey Cox and Loader 139). All these ideas show how closely design thinking and innovation are linked. They are often defined in similar ways as a process that results in the implementation of ideas.

The link between innovation and design thinking was also studied by Sara Beckman and Michael Barry who proposed that the design thinking process could be better explained by using the fundamental principles of innovation (25 - 56). By examining design thinking through the lens of innovation, they reviewed literature and found three key points regarding using a design thinking approach. First, that innovation requires an understanding of the process, an

ability to move between abstract and concrete information, and the skill to analyze and synthesize information. Second, it means finding the right mix of people and talent to work on a project. Third, that having a leader to guide the team through the process is critical to the success of the project. This study's results show that the leadership role is very influential in cultivating innovation. While leadership was important, the team determined whether a change in the culture or the climate of a company was successful.

THE RELATIONSHIP BETWEEN INNOVATION AND COLLABORATION

Once an organization understands how to define innovation, they can begin implementing a culture that supports it. Erika Agin and Tracy Gibson discuss the important role leaders play in creating a culture of innovation across all levels of employees (52 - 55). "Employees must be given the opportunity to do what they find to be satisfying in their jobs to harness the creativity necessary to establish an innovative thought process" (Agin and Gibson 55). It takes time to build a culture of innovation but they suggest that one way to help develop a culture is to use new graduates along with seasoned professionals. The fresh ideas from the young employees and the experience from the seasoned professionals can combine to develop innovative solutions.

Anne Linke and Ansgar Zerfass also describe the importance of culture in promoting innovation in a company but take a different approach for building the culture (322 - 48). They view the process of developing a culture within a company parallel to the approach of a change initiative. People need to have time to go through the stages they feel when a change happens

and the communication should match those feelings. “In other words, internal communication needs to adapt to different change phases with specified messages and tools to transmit an innovation philosophy. Employees then undergo different stages of dealing with it before they will take action” (Linke and Zerfass 343). By providing employees with the information they need in each stage of change, this type of approach can make the culture of innovation more likely to stick.

The right amount and types of communication among team members can be important for the success of innovation. Lori Fidler and David Johnson discuss how the amount and type of communication can vary from project to project (704 - 11). Each project must be evaluated to see if the time and resource investment for communicating is worth the cost. Too little or too much communication can negatively affect the project. There are situations where the costs will always outweigh the benefits and make innovation impossible to implement. Before any innovation begins, the amount and kinds of communication need to be considered if the project has a chance of being successful (Fidler and Johnson 704 - 11).

Jan Kratzer, Roger Leenders and Jo van Engelen also discussed the importance of the amount of communication between employees on innovation (63 - 71). Their study was focused more on the team aspect and showed that it is best to limit the frequency of communication to achieve the most innovative teams. “Communication is the basic lubricant that transports the resources necessary to be creatively performing, in the form of information to the team members” (Kratzer, Leenders and van Engelen 69). Another recommendation is to

change the teams often so it prevents the formation of sub-groups. Creative performance diminishes when people work with the same groups repeatedly. New groups can keep the team from getting too comfortable having certain roles within the group and it can bring in new perspectives.

One of the newest insights on innovation is how teams communicate using information communication technologies (ICT). Leif Gressgard discusses the influence that ICTs have on the way that employees communicate (102 - 19). Companies have people working from different locations that need to communicate often and ICTs are currently the most effective and economical way to achieve this. "Innovative work in modern organizations thus occurs in new and changing social contexts, which implies that the opportunities for communication and cooperation may have consequences for organizations' innovation capabilities and organization of innovation activities" (Gressgard 105). There are limits to technology so these have to be considered when deciding the best method for communicating in teams. In the future there may be technologies that make us feel as connected as face-to-face interactions but for now it seems that a mix of ICTs and in-person communication is the best solution. For example, webinar software, google hangouts, and skype are technologies that can be used when working with a team that is unable to meet face-to-face.

PART 3: CASE STUDIES

CHAPTER 6: USING DESIGN THINKING COLLABORATION TO DRIVE INNOVATION

I. BACKGROUND

I conducted a study of three Minnesota-based companies to compare how they are using the design thinking approach to facilitate collaborations and what methods had the best results. My criteria for choosing the companies were that they have more than one hundred employees, were already using design thinking and collaboration between departments, and have headquarters in Minnesota. Based on the criteria I chose UnitedHealth Group, Milestone AV Technologies, and The Nerderly. The participants were not asked to share any personal or financial information. Due to the sensitive nature of information in the healthcare industry, I was not allowed to take pictures of any interior spaces at UnitedHealth Group.

The research was evaluated using the *Organization Development Theory*. This theory is based on “expanding the knowledge and effectiveness of people to accomplish more successful organizational change and performance” (“Organization Development Theory”). The key concepts of the theory are organizational climate; the way an organization supports communication, participation, and leadership, organizational culture; the values and beliefs about the organization that are shared by employees, and organizational strategies; the approaches that organizations use in times of change (Anderson 1-15). An organization can use an approach to change the climate and culture. The *Organization Development Theory* demonstrated how design thinking could be used as an approach to change how members of a

team collaborated in a company to create a culture and climate that encouraged finding innovative solutions to problems.

METHODS

This study investigated why, when, where, and how collaborations are taking place in companies that use design thinking. It explored how companies are using design thinking as an approach to facilitate collaboration across departments and whether collaboration increased innovation. It also investigated who was involved in the process and what type of results were achieved. Research was conducted at Milestone, The Nerdery, and UnitedHealth Group where I observed behaviors, interactions, and methods used in collaboration. I conducted interviews of design thinking team members from each company (Appendix A). The survey questions were pre-tested with a sample of five people to find the most relevant questions. Each company was at a different stage of implementing design thinking into their culture and has achieved varying degrees of success.

The independent variables for this study were *purpose, logistics, team dynamics, and evaluation methods*. The independent variables affected the moderate variable of using the design thinking approach. The design thinking approach influenced the dependent variable of collaboration between departments and this collaboration between departments was expected to increase innovation (Fig. 5). The independent variables were expected to influence the effectiveness of the design thinking approach, which would affect the kind of collaboration that occurred. This study showed the effects of collaboration between departments using a design

thinking approach. An evaluation of the independent variables showed the skills and resources needed to have successful collaborations that could lead to increased innovation and success on the project.

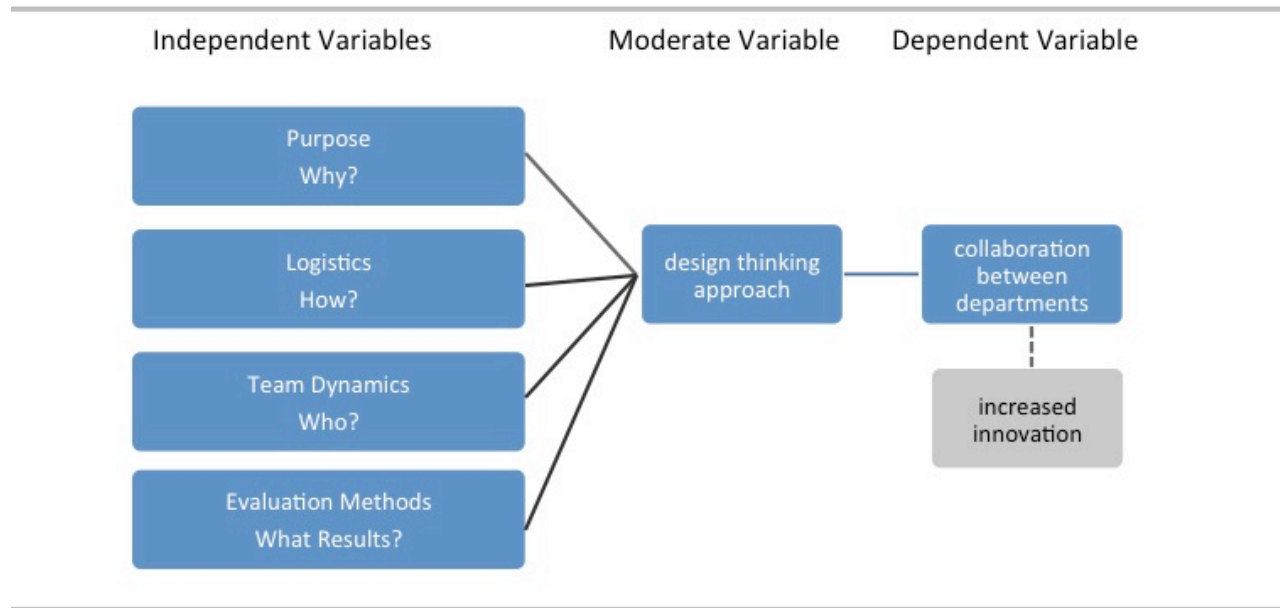


Figure 5. Model of variables of the study.

II. MILESTONE AV TECHNOLOGIES

Milestone AV Technologies is a manufacturing company with offices in Minnesota, Chicago, the Netherlands, Hong Kong, and China. They manufacture mounting devices for audiovisual equipment and are headquartered in Eden Prairie, Minnesota. The company was founded in 2004 and they currently have about 345 employees (“Company Overview”). Employees have been using design thinking for the last year and have had continued training on how to use it. I observed the spaces, interactions between employees, and the resources

available. I interviewed a person in a leadership position who was very involved in the process from the beginning.

OBSERVATION FINDINGS

The office building is large and houses only Milestone AV Technologies. Employees are physically separated with multiple floors and a traditional layout of cubicles with a few private offices. It was very quiet as I walked through the space and the arrangement of desks and cubicles seemed to encourage employees to focus on their own work rather than collaborative work, although there were areas for collaboration such as typical meeting rooms and one specially designed room. This special room was intended for design thinking collaborations and was open for anyone to use at any time. Employees just had to reserve it or could walk right in if it was open. The room was stocked with resources such as sticky notes, white boards, craft items, and building materials that could be used to develop ideas and build prototypes.



Figure 6. Design Thinking training at Milestone. (“Milestone Goes Back to School”)

INTERVIEW FINDINGS

CULTURE

The interview findings showed the amount of collaboration that was happening using design thinking. The CEO initiated the use of design thinking to help grow the company and improve processes and products. He initially sent three people to training and then provided training for additional people throughout the company. Milestone has been using the process of design thinking for over a year with success, largely due to the support of the CEO to continue its use. Employees are expected to use design thinking on projects and are provided with frequent training and resources. The projects involve working together with people from various departments throughout the company, both onsite and in satellite offices. The combination of these resources seemed to create a culture that supported and sustained the use of design thinking.

PHYSICAL ENVIRONMENT

The physical space and resources provided have largely impacted the use of design thinking on projects. The CEO hired Stanford's d.school to facilitate continued training and has been providing sessions to teach and refresh employees about the approach. The design thinking room has created a space where teams can work together on projects and have all the resources that they need. The crafts and building materials in the room allow for employees to work with their hands on projects. Many employees spend all day working on a computer and are enjoying the opportunity to work with their hands on projects. Although design thinking can

be done anywhere, the space is a daily reminder of the company's intention to use the approach. One challenge for working together is having people located on different floors making it difficult to have impromptu conversations on the project. The arrangement of the floor plan also hinders the ability for teams to work together. This affects how the team functions and the success of the projects.

TEAM DYNAMICS

As with any change, there has been resistance from some people to participate. Personality types have greatly influenced who has embraced the process and who has found it more challenging. Introverts involved on projects have taken longer to be comfortable working so closely in a team environment but eventually have seen the value in using the process. Overall, employees feel that using design thinking has improved the culture, created a less formal atmosphere, and given everyone a voice. One obstacle has been changing people's mindsets to try something new. Another obstacle has been keeping it fresh in people's minds so that they use it on a regular basis. It has mostly been a positive experience and been widely accepted throughout the whole company. One indication of the success is that the people who participate in design thinking projects are recognized by others in the company and often asked to assist with projects.

EVALUATION METHODS

Although the employees feel that the use of design thinking has been a success, one of the hardest things for management is to define measurements of success. Milestone's

leadership is using the time saved on projects as a measurement. Teams are completing projects more quickly, which allows products to get products on the market faster. The use of design thinking is reducing cost of time and resources spent on projects and allowing products to start making money earlier. The financial gains have reinforced the use of design thinking as an approach to collaborate on projects and develop innovative solutions. Some of the skills that leadership has seen emerging from participants are brainstorming, time management, and teamwork.

III. THE NERDERY

The *Nerdery* is a company based in Bloomington, Minnesota that specializes in web development with a focus on user experience. The company was founded in 2003 and has expanded with offices in Chicago and Kansas City (“Company Profile”). They currently have about 441 employees and have been collaborating between departments since the company’s inception. They may not always define how they work together as design thinking, but in many cases it is that approach. I observed the spaces, interactions between employees, and the resources available. I interviewed a person in a human resources position who was very involved with several different departments.

OBSERVATIONAL FINDINGS

The layout of the offices was very open and there was a lot of activity and people interacting (Fig. 7). Most of the office is located on one floor, although there are several people located in another building that is shared with multiple other businesses because they have

outgrown their space. They have a lot of open spaces and desks situated into group workstations, which allows employees to collaborate easily. The meeting rooms and collaborative spaces spread throughout the office space demonstrate their focus on teamwork. Although there were many people walking around and engaging in different ways throughout my visit, there still was a focus on getting the work done so many people were at their desks working as well.



Figure 7. Office space at the Nerderly (“Getting on the Lawn”)

INTERVIEW FINDINGS

CULTURE

The Nerdery is a new company that has been built on the idea of a collaborative work environment. The management developed hiring practices that let potential candidates know it is a collaborative work environment so people that are uncomfortable with that type of environment do not get hired. This reduces turnover and selects for employees who thrive in a culture of collaboration. As a company, they do not like to label any of the processes that they use and like to use many ranging from *Six Sigma* to design thinking. The owners support the use of multiple processes that encourage people to work together to develop solutions. My focus was solely on how they used design thinking.

PHYSICAL ENVIRONMENT

The layout of the desks and meeting spaces has created a physical environment that encourages working together on projects. White boards cover the majority of the hallways and there are many themed meeting rooms with building materials and resources for group activities. There are cubicles in some areas but many areas are set up as groups of tables for people to work together. Leadership often initiates the projects but employees know that they are encouraged to use design thinking on any project. Most projects take place in person but there is an effort to include more virtual teamwork especially since the company has people in several other states.

TEAM DYNAMICS

The amount of collaboration can be attributed to a culture that supports and encourages it. The leadership is supportive but has not provided any training on design thinking or any other process. Employees know they are expected to work together on projects and will be moved around frequently to different projects. They bring their own experience and expertise to teach each other. Employees are often moved to another project before their current project is finished so they need to be agile and willing to learn new things. The leadership believes that changing team members keeps ideas fresh and supports their environment of collaboration. There has not been a lot of resistance, which is largely due to their hiring practices and the goals and mission of the company. The skills that the Human Resource Department looks for when hiring are teamwork, flexibility to move from project to project, curiosity and desire to solve problems, and willingness to try new things.

EVALUATION METHODS

The Nerdery is still figuring out the best methods to measure success. Currently staying on schedule for projects has been a measurement although there is no formal evaluation process for this. Employee satisfaction has also been an important measurement. There is not much turnover and employees feel challenged so they do not get bored doing the same thing every day. One obstacle has been making virtual teams as effective as in-person teams. The company is experimenting with various technologies to make this more efficient.

IV. UNITEDHEALTH GROUP

UnitedHealth Group is a large diversified company with several offices located throughout the United States. I chose a division in the main Minnetonka offices for my observation and interviews. The company has over 100,000 employees so my observations are not indicative of how departments function throughout the whole company. I observed the spaces, interactions among employees, and the resources available. I interviewed a person in a marketing position who was a member of a small department that was formed two years ago. Employees frequently are required to work with other departments to complete projects.

OBSERVATION FINDINGS

This space resembled the set-up of the Milestone offices. The office is one building of many buildings located throughout Minnesota and has mostly cubicles with several meeting rooms and common areas where meetings can be held. The meeting rooms had typical office supplies but no special resources to support design thinking meetings. Due to the sensitive nature of medical information, I was not allowed to take pictures inside the building, but the number of floors demonstrates the physical divide between departments. The layout had an impact on how employees interacted and the types of collaborations that occurred (Fig. 8).



Figure 8. One of several large UnitedHealth Group offices. (Star Tribune)

INTERVIEW FINDINGS

CULTURE

This particular department at UnitedHealth Group is in the beginning stages of using design thinking and has struggled to implement it. The department has not established processes to encourage design thinking. Not having established processes makes employees more flexible to try new things but at the same time limits the department from developing a culture that supports collaboration. A lot of time is wasted trying to figure out the best methods and how to make a standard process for problem solving. Leadership has not provided training so employees are using the prior experiences of one individual to guide them.

PHYSICAL ENVIRONMENT

Currently, the marketing department is using conference rooms, public areas, and the cafeteria as areas to meet on projects but the department has not altered the rooms in any way to assist in the design thinking process. Lack of alteration has made it difficult to communicate during project meetings, but providing resources for visual representations like building materials, whiteboards, post-its and computer programs could improve this process. People in leadership decide who works on projects, so non-leadership employees do not use the process unless instructed. Collaboration using design thinking is having positive results according to the employees but needs more support from leadership and training for leadership and employees.

TEAM DYNAMICS

Leadership has shown interest in using design thinking but is not leading the team with the resources they need to create a culture that encourages the use of it. Employees are struggling to find time and even struggling to remember to use the process when working on projects. Some staff have resisted design thinking because they do not believe that it will work. There has not been training provided to any employees, so some members struggle with how to use it and do not really know how it will benefit their projects. Contrary to my view, these employees do not feel that a lack of training has hindered the process, but rather they believe lack of time and resistance from some, have made it hard to implement.

EVALUATION METHODS

Leadership is trying to measure the success of projects by meeting deadlines, enrollment goals, and feedback from customers. When employees use the design thinking approach, the company has seen positive results, but employees are not using it consistently. Employees feel that the use of design thinking has improved the culture and made them feel like they can contribute to the solution. Despite the success, time to dedicate to working in teams and reluctance of some to participate remain obstacles. The skills that leadership has seen emerging are being able to work with different personalities, managing time, and being decisive.

V. RESULTS

The interview results of the three companies showed the employees' perceptions of the process and the team. This allowed me to compare what I viewed in observation to their perceptions. I compared the way teams worked together, how they met goals, if they matched leadership and company expectations, and if the solutions were innovative and profitable for the company. Some common themes developed after evaluating the observation and interview findings from the three companies. The following will review and provide context for part four of the paper containing recommendations and methods for using design thinking in a company.

OVERALL OBSERVATION FINDINGS

Based on my observations, the physical space and resources provided have a big impact on the success of using design thinking. Spaces that encouraged people to meet and be able to

visually represent their ideas were more collaborative. One layout is to have open space with white boards so people could meet in the hallway and have discussions without having to set up a formal meeting space. The offices that had the formal cubicle setup made people seem less approachable since people did not see each other as frequently. This suggests that the physical environment may need to change and visual materials such as building materials, whiteboards, and computer software be provided to support design thinking.

OVERALL INTERVIEW FINDINGS

CULTURE

Milestone was the only company that had leadership who clearly defined the purpose of using design thinking. The Nerderly had a collaborative environment so even though the purpose was not clearly defined, their culture supported design thinking as much as Milestone. The supportive culture encouraged acceptance by employees and could account for some of their success in using it frequently on projects. UnitedHealth Group struggled the most with changing the culture and did not have the support of the highest leadership to invest the resources to create a change that sticks.

PHYSICAL ENVIRONMENT

The offices that had areas dedicated with spaces and visual resources were the best prepared for the use of design thinking. The Nerderly's whole building accommodated design thinking, Milestone had one room with resources, and UnitedHealth Group had no special accommodations. Accessibility to each other, collaborative spaces, and visual supplies seemed

to be the biggest environmental factor for success. UnitedHealth Group and Milestone with multiple floors of people had a hard time connecting with other departments, so it took more effort to keep the process going. Virtual teams also seem to struggle especially at the Nerdery. Because they have offices located in multiple states, employees required the use of technology to communicate and had difficulty communicating in way that optimized time and participation in the project. The Nerdery is aware that virtual teams are a problem and are still experimenting to find the best technology to assist with design thinking projects.

TEAM DYNAMICS

Milestone and the Nerdery had a culture that supported collaboration and the use of design thinking which increased the success on projects. Support from leadership and time dedicated to the process seemed to have the highest impact on whether the process became part of the culture. At all companies, much of the resistance was because people did not believe that using design thinking would work or they did not like having to work in teams on projects. Overall, the use of design thinking improved the culture of the company by making people feel like they were contributing to solving problems. Employees liked being able to express their opinions and ideas even if they were not used in the final product.

EVALUATION METHODS

None of the companies established measurements before starting to use design thinking. They did use time saved on projects, getting products to market on time or before deadlines, and feedback from clients as measurements after projects were was completed.

These are mostly anecdotal results since previous projects were not measured in the same way so there are not many projects to compare. One benefit of evaluation after the project was that it helped the companies determine the amount of time and resources that would be needed on future projects. Employee satisfaction can be as important as financial measurements when calculating the effectiveness, but was not mentioned by leadership. In some ways, the Nerdery's leadership emphasized the importance of employee satisfaction with their hiring practices. They hired only people they felt would thrive and enjoy their collaborative environment.

Figure 9 summarizes the common themes that emerged from the interviews and illustrates who had success in each area. Based on the charted results, Milestone had the most success in using design thinking to solve problems in their company. The chart shows that they have excelled in more areas than the other two companies, but does not indicate the results of any particular project. The Nerdery also feels they have been successful but seems to be struggling in providing training, establishing measurements, and communicating the goals or purpose for using design thinking. UnitedHealth Group has admitted they are in the beginning stages and have struggled to sustain a culture that supports collaboration using design thinking. They do not have leadership strongly supporting the process; they have no clearly identified goals, no training or resources, and have not established measurements.

RESULTS OF INTERVIEWS	MILESTONE	THE NERDERY	UNITEDHEALTH GROUP
Have a culture that supports design thinking	✓	✓	
Leadership supports the process	✓	✓	
Have set goals/purpose for using the process	✓		
Have physical space for collaboration	✓	✓	✓
Provide resources for design thinking activities	✓	✓	
Recognize team accomplishments	✓	✓	
Change team members frequently		✓	
Provided training	✓		
Established measurements			
Have reported positive results for stakeholders	✓	✓	✓

Figure 9. Results of case study participants

VI. LIMITATIONS

This study is exploratory, and only provides a broad overview on the subject, and does not have enough participants to be applied to all company situations; however, these case studies can suggest future deeper investigations into the topic of design thinking and collaboration. I would recommend a study that includes more companies and participants in each company for a more expansive investigation into the topic.

PART 4: FOSTERING COLLABORATION USING DESIGN THINKING

CHAPTER 7: RECOMMENDATIONS AND METHODS

The following recommendations on how to use design thinking in a collaborative environment are based on the results of the case studies. Companies that want to create a culture of innovation to stay competitive can use the approach of design thinking. Here are several things that a company can do to increase the success of the process.

CULTURE

Create a culture that supports design thinking.

Initiating a new process such as design thinking is challenging even if the company culture supports it. Employees will be more likely to try to sustain use of a new approach if there is a culture that encourages it. Two ways to show that employees are encouraged to use the process are providing continued training and recognizing successful projects. The Nerderly even hired on the basis that employees would work in a collaborative manner.

Leadership needs to encourage and support the process.

Employees will be more likely to use the process if leadership is providing them with the time and resources they need. Learning a new skills takes time so additional time should be made available as part of their job duties. Leadership needs to be clear that employees are expected to use the process and that they will get what they need to be

successful. Milestone's CEO initiating the trainings demonstrated to employees the commitment of top leadership to design thinking.

Goals should be agreed upon before the project begins so everyone has a united and clear purpose.

The goals of the project can determine measurements of success, who needs to be involved, and what the purpose is. This should all be decided on before starting the project to maximize the potential for a successful result. Milestone clarified that the purpose of using design thinking was to develop more innovative products so employees knew what the goal of each project was from the beginning.

PHYSICAL ENVIRONMENT

Create a specific space that has room for movement as a group.

Design thinking requires that people work together on projects, which means that there needs to be physical space for groups to gather. The space should provide flexibility for people to stand, sit, and make prototypes. The Nerdery's whole building provided an atmosphere that had spaces for impromptu and planned meetings. There was an ability to work in a group in almost every space in the building.

Provide visual materials for the group to brainstorm and prototype.

Prototyping is an important step in the design thinking process so there should be visual materials for team members to create representations of the final project. Some examples of visual materials are whiteboards, craft and building materials, computers, and post-it notes. The Nerdery excelled at providing these materials throughout the

building. The target example of having resources available at any moment was having most of their hallways covered in whiteboards.

Provide technology for virtual communication for the teams.

Many companies have employees at multiple locations and working on a project can be problematic. Technology can be used to support virtual teams and can help teams in the same space who want to have quick meetings without having to meet face-to-face.

Some examples of technology are Google Hangouts, webinar software, videoconferencing, and chat. None of the companies were successfully doing this, but the Nerderly was making an effort to improve.

TEAM DYNAMICS

Recognize the group's accomplishments.

Recognizing the success that groups using design thinking are having can encourage current users and inspire other employees to try it. It can help identify people within the company with experience using design thinking who can be a resource to guide others.

Employees with design thinking experience at Milestone were asked by other employees to help on projects after hearing about the positive results of the design thinking projects.

Change team members frequently.

Team members can develop certain roles when they work together with the same people on projects. Reassigning members allows for new perspectives, shifting roles for

each team member, and the benefit from a variety of expertise. The Nerderly does this frequently on projects to keep fresh ideas coming into projects.

Provide training and support.

Not everyone will have used design thinking before so it is important to provide training. Schools and consultants are some of the best places to obtain training on design thinking. Even after initial training, it is important to keep providing training to refresh people on the process and share new ideas on how to use it. Milestone provided training and has continued to provide it so employees are equipped with the knowledge to use design thinking in an effective way.

Involve all stakeholders in the process.

Everyone that will be affected by the process should be consulted. This is essential in the empathy part of the design thinking process to consider how the results will affect all users. All of the companies were involving the stakeholders to a small extent, but not necessarily throughout the whole process. Users should be continued to be involved throughout the whole process to ensure the solution will match their needs.

EVALUATION METHODS

Establish measurements of success before the project starts.

Leadership often needs proof that a project is successful so deciding what is most important to the organization can provide the evidence that they need to determine success. Some measurements can be employee satisfaction, financial gain, and saved

time. Milestone was having the most success with measurement because they were getting their products to the market faster so they could see the financial gains.

Find the skills that benefit the organization and train or hire based on them.

Having the right skills can impact the success of using design thinking in an organization.

Current employees can be trained in those skills and companies can find employees who already have knowledge in those skill areas. The Nerdery hired based on the skillset needed for design thinking and Milestone provided training for it. Both are effective ways to support design thinking in a company.

CONCLUSION

SKILLS NEEDED

This research not only showed best practices for how to use design thinking in an office environment, but it also identified some of the skills that are needed for using design thinking to collaborate across departments to solve problems. Four main areas emerged as critical to the process: generating solutions, managing time, creativity, and working in teams. These specific skills are sought across employers in office environments suggesting that there is a need that could be met by people trained in the design thinking approach.

The ability to generate solutions through problem solving and decision-making is a skill that has been in high demand not just for design thinking. Critical thinking, complex problem solving, and judgment and decision-making are the top three skills that employers are seeking based on the research gathered by Forbes (“The 10 Skills That Will Get You Hired in 2013”). Based on the search engine *Wanted Analytics* (which combines all current job postings into one searchable site) Minneapolis metropolitan area jobs that require design thinking also require analytical, problem solving, and critical thinking skills (Wanted Analytics).

Wanted Analytics also revealed the need for creativity as a top skill for office jobs. This matches the findings from the case study participants who placed high value on curiosity, willingness to learn new things, and brainstorming. National Careers Service lists making decisions, flexibility, time management, creativity and problem solving, and being a team player

as some of the top skills employers are looking for (“What are the ‘Soft Skills’ Employers Want?”). Study participants also found that time management, flexibility in changing projects, frequently using teamwork, and working with other personalities were necessary to successfully use the design thinking approach. The commonalities between design thinking skills and the top skills employers are looking for in office-based jobs demonstrate a potential for the collaborative approach of design thinking to fill that need.

FUTURE IMPLICATIONS

With the job market changing and many baby boomers about to retire, employers in office environments are seeking problem-solvers who can do more with less. Collaborations using a design thinking approach have the possibility to help in this area. Collaborating with other departments allows companies to tap into talent resources that they do not have in their own department, and the act of working together to solve problems provides hands-on training and perspectives into other fields. Employers are asking their employees to have a broader range of knowledge to stay competitive. This could mean that students are going to need to start developing these skills at an early age.

Schools like The Nueva School in California are already bringing design thinking into their curriculum. The students work on projects by using the design thinking process of “research, focus, generate ideas, make informed decisions, prototype, and collaborate” (“Design Thinking”). The school aims to solve real problems presented in classes by teaching students critical thinking, collaboration, openness to others’ ideas, the ability to view failure as

a learning experience, and knowledge of basic project management and problem solving skills. The school does not focus on lecture but has labs set up for students to work together on projects that address subjects they are learning in class. The students bring various ideas together and learn how to work in teams to solve problems that make the subject matter more relevant to real life. This type of learning will be more important to integrate into the classroom as we move into the future where problem solving and critical thinking become more essential for remaining globally competitive.

The trend toward addressing changes in skills needed for employment in office jobs is likely to increase in the future leading to more schools embracing the types of training and innovation labs that are taking place at schools like *The Nueva School*. The changes mean that educators will need to be trained differently to develop new formats of curriculum that integrate a new kind of learning in our schools. At the college level, students will need to take courses that train them in the practice of design thinking and collaboration. Although there might be a major devoted to the subject, all students who have a future career in office environments could be encouraged to take courses to broaden their skill-sets.

Businesses may want to invest in a department or teams dedicated to collaboration and the generation of solutions to internal and external problems, or they may want the whole company to learn how to use design thinking to collaborate with each other. Either way, they will need to provide continued training and resources if they want it to become part of their culture. Businesses in the future will need different strategies from those in use today, and

design thinking is a collaborative approach that can help solve the complex problems that they will face. The current market is already showing the need for design thinking skills, but if the trend continues, there will be a much greater demand that will create new opportunities for current and prospective job seekers. Design thinking has the potential to create a more collaborative environment for companies to solve their complex problems and create a culture that supports and encourages employees to be engaged and committed to their work.

APPENDIX A

Questions for Case Study

Culture

- What types of collaborations are taking place in your company to use design thinking to solve problems?
- Why are you using design thinking to collaborate in your workplace?
- Do the collaborations involve multiple departments?
- What are you modeling your effort on? Is there someone else you know who is successfully doing this?
- Have you used other strategies to solve problems?
- If so, how does design thinking differ?
- Has working together changed the overall culture of the company? If yes, has this created either turnover or greater retention of employees?
- Did you have to provide training?

Physical Environment

- Where are people working together? (online, in-person, over the phone...)
- Are these collaborations scheduled or are they happening on their own?
- If in-person, what kinds of spaces are they using? (conference room, cafeteria, someone's office...)
- How often do groups meet?
- How are you determining the length of the project?

Team Dynamics

- Has there been resistance from people to participate?
- What is the response from employees? Do they like working together?
- Does the team support the member's needs?

- Is the team meeting expectations?
- Do team goals match organization goals?
- Are the team's accomplishments recognized?
- Is leadership supporting the projects?
- Who is deciding who works on the project?
- Who decides what projects need a design thinking approach?
- Do you have a facilitator?

Evaluation Methods

- Is the team meeting goals on time and within budget?
- Is there a clear direction on projects?
- Is there a high customer demand for the product/process?
- Does the final product meet company expectations?
- Is the design thinking process efficient?
- How are you measuring success or failure?
- What are the obstacles preventing collaboration?
- Do you plan to expand this model to other parts of the company?
- Are there certain skills that are emerging as most useful in the process?
- What part of the process is most challenging?
- What issues in the company is design thinking not addressing?

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