Designing for Collaboration

A case-study approach to understanding how architecture firms provide effective project leadership through the formation and support of teams, within the context of emerging project delivery methods

Student: Kirk Hochstatter

Faculty Advisor: Tyler Sprague

Consortium Firm: ZGF Architects

Firm Advisor: Todd Stein

Acknowledgements

As a resident of the city of Seattle and a student at the University of Washington, I acknowledge the Coast Salish peoples of this land, the land which touches the shared waters of all tribes and bands within the Suquamish, Tulalip and Muckleshoot nations.

I acknowledge all the faculty at the UW who have supported and challenged me to grow in my experiences as a student, researcher, instructor, professional and human being. Thank you to Renee Cheng for developing and leading this Applied Research Consortium and making time to help guide me on these topics. Thank you Jennifer Davidson and all the individuals who make our cohort of fellows work and develop a research community. Thank you Bill Bender who introduced me to the opportunity with the ARC fellowship and Carrie Dossick for patiently guiding me through these topics and research methods.

A very special thank you to my research advisor, Tyler Sprague, whose teaching and research skills were critical in converting my abstract ideas of team formation and collaboration into this report. The UW and CBE is fortunate to have such wonderful faculty leading their community.

The graphics developed would never have happened without the support from Michelle Mills at ZGF and inspiration from my graphic design hero, Ted Marshal. The survey developed would not have been possible without the help from Alec Thomas, Timur Dilek, Matthew Fisher and Brian Uphoff. I'd also like to give additional recognition to Carrie Cassidy for the years of support and leadership she's provided me professionally, academically and personally.

There is not enough room to acknowledge all the tremendous support I received at ZGF Architects. Thank you Victoria Nichols and Allyn Tellmacher for supporting this pilot program and taking a chance on me and thanks to all the partners who candidly shared their and the company's approaches to leading projects. And biggest thank you Todd Stein for all you're all of what was just said, making me feel welcome at ZGF and your leadership throughout the experience. ZGF's Seattle office is some pretty great hands.

The last people I'd like to thank have been the most critical in any success I drive from my academic and research pursuits; my family. Each hug I've received from my children, Lucille, Alice and Hank has powered me through some very challenging moments and each word of encouragement I've received from my father, sister and brother remind me that what I do is important. A very special thank you to my mother, MaryAnn, who introduced her family to the ZGF Portland office over 30 years ago and ultimately inspired me to not only do this research but also be a part of the construction industry.

And none of this is possible without the love, support, encouragement, guidance and leadership of my spouse, wife, parent to our children, best friend and partner in crime, Megan. You inspire me every day and give me the confidence to explore and be myself. I love you.

Executive Summary

Research Background

This research will focus on project teams within a single architectural firm, and examine how they work on complex, collaborative project delivery methods. Understanding the different scales of the organization (firm), internal project team (inside the firm), and external project members (outside the firm), this focus is intended to show potential structures and variables that affect the ability of the project team to meet the complex demands that come with Integrated Project Delivery, Design-Build, and other emerging project delivery methods. The Recommendations are intended to provide useful information to others on how architecture firms can continue to demonstrate effective project leadership.

Research Outline

The goal of this research was to understand leadership strategies that support collaborative team outcomes and develop recommendations that can lead to effective team operation in the context of emerging project delivery models. This will be accomplished through a case study examination of internal team operation, leadership strategies, and partnering with other organizations utilizing collaborative project delivery methods.

Methodology

Several projects utilizing collaborative project strategies were identified for case study examination. Interviews were conducted with Principals-In-Charge and Project Managers (PIC/PM). The interview questions focused on leadership strategies that addressed clarity of project roles, focus on project objectives and driving equal accountability within the internal ZGF project team and the external partners.

The responses from the interviews lead to a focus on forums where leadership strategies are communicated and the survey was developed to gather opinion on how frequent certain tactics were used including project meetings, technology applications and team building exercises.

A survey was also developed that was distributed to ZGF project teams and leadership from external partners like project owner representatives, design consultants and general contractors. Considering past research on work groups and teams in organizations, the survey included questions centered on related context including task interdependence and working experience as well.

Surveys were collected and individual responses were examined within their respective case study, project, organization and leadership role. The findings focused on responses that showed the strongest agreement across the individual responses within their case study categories. Recommendations were developed based on these finding and the context of their contract and partnering strategies, team experience and task interdependency.

Case Study Findings

Case Study #1 – WSU Tri-Cities: Academic Building

WSU Tri-Cities: Academic Building	
Project Formation Strategy	Design-Build Partnership
Task Interdependence	Often with all teams
Working Experience	A mix of new and veteran working relationships
Leadership Strategies	Often use of 1-on-1 meetings and shared digital programs

Table 1 - Case Study #1 Executive Summary Recap

Case Study Recap: This project consisted of a "typical" ZGF project team and stands out from the two other case studies due its smaller project size and "design-build" partnership. Results from the survey indicated on leadership strategies indicated a higher frequency of 1-on-1 meetings and evidence of utilizing shared digital programs. The only case study that had a design-build contract agreement did show slightly higher task interdependence emerging with the GC as it related to working with the ZGF project team.

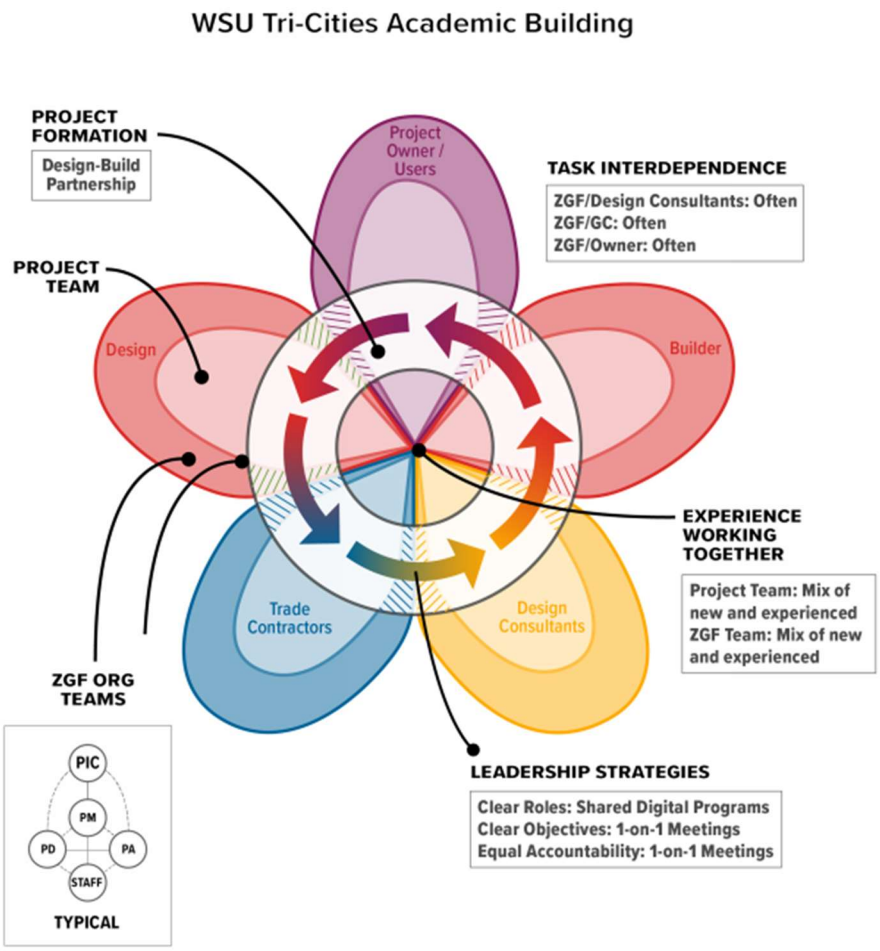

Figure 1 - Case Study #1 Executive Summary Recap

Case Study #2: Seattle Children's Hospital - Forest B Expansion

Seattle Children's Hospital - Forest B Expansion	
Project Formation Strategy	Design-Bid-Build / Trust
Task Interdependence	Often with design consultants and owner.
Working Experience	A mix of new and veteran working relationships
Leadership Strategies	Often use of project meetings and 1-on-1 communications.

Table 2 - Case Study #2 Executive Summary Recap

Case Study Recap: One of the two healthcare projects with a "mega-team" examined. ZGF and the builder contracted separately with the owner and a team formation strategy was based on a trusting relationship with the owner and general contractor. The findings showed a high frequency of project meetings being used to drive the leadership strategies examined and the highest task interdependencies where explicit contracting agreements exist.

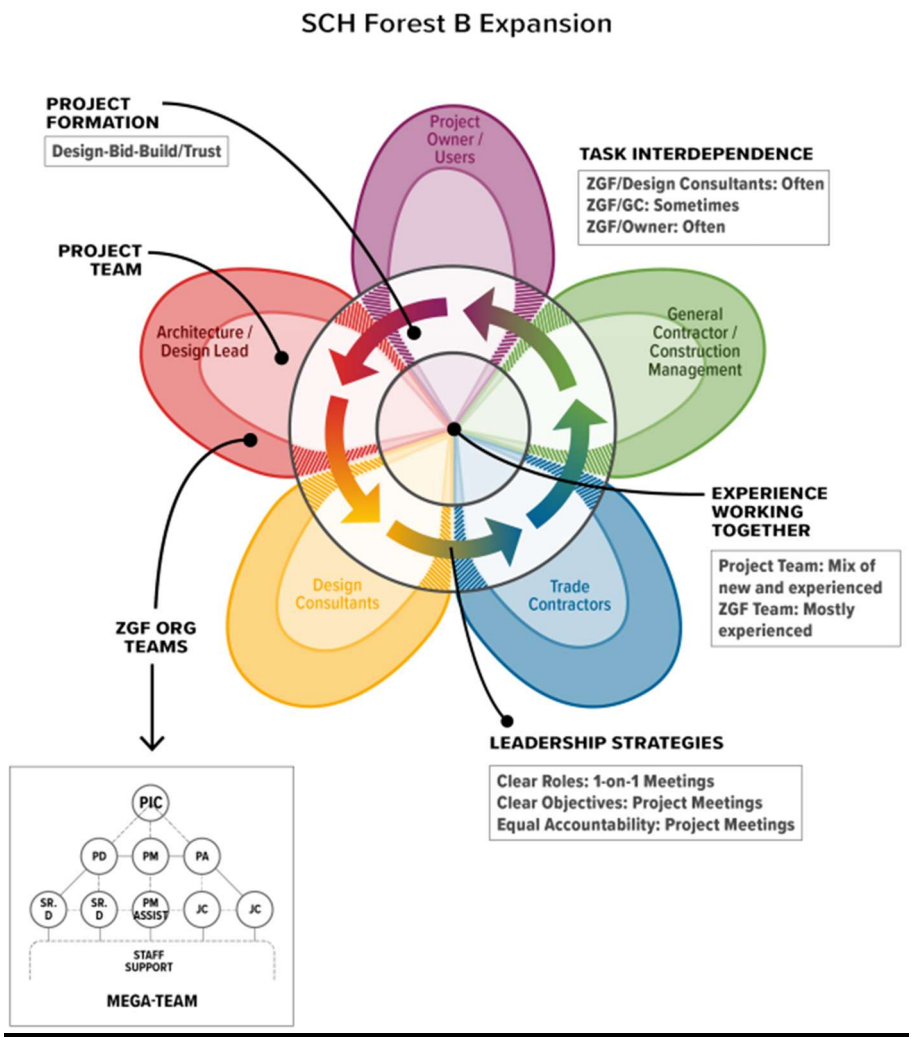

Figure 2 - Case Study #2 Executive Summary Recap

Case Study #3: Cincinnati Children's Hospital – Medical Center

Cincinnati Children's Hospital - Medical Center	
Project Formation Strategy	CM at Risk /Collaborative Teaming Agreement
Task Interdependence	Often with design consultants and owner.
Working Experience	A variety of veteran experience within ZGF and project team
Leadership Strategies	Often use of project meetings and group messaging apps.

Table 3 - Case Study #3 Executive Summary Recap

Case Study Recap: One of the two healthcare projects with a "mega-team" but located nearly 2000 miles from the ZGF Seattle office. In a very transparent, documented, and methodological process, the project team decided to execute separate contracts with ZGF and the builder that included a collaborative teaming agreement. Project meetings were a frequent forum for the leadership strategies examined and group messaging applications when communicating clear roles within the ZGF Project Team had one of the highest frequencies of all forums examined.

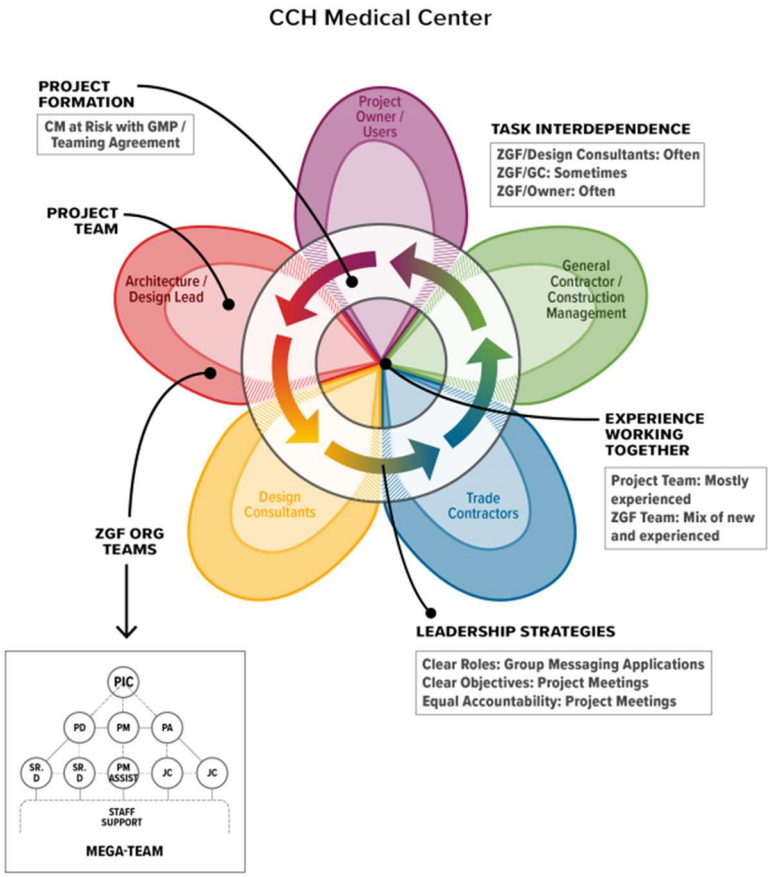

Figure 3 - Case Study #3 - Executive Summary Recap

Recommendations

Working Locations - *Recommendation: Explore how to share spaces with individuals and groups that have a high level of task interdependency. Emerging delivery models create new contracting relationships and needs to adjust where we work*

Digital Sharing - *Recommendation: Appreciate the value in sharing across digital platforms.*

Project Meetings - *Recommendation: Execute project meetings with purpose and focus on specific methods that lead to desired collaborative outcomes.*

Clear Objectives - *Recommendation: Expand ZGF's culture of sharing by including more project individuals in team building exercises*

Leadership Strategies - *Recommendation: Trust your instincts and your teams. Every project is different and you will need to trust the individuals who are working directly with the situation to make the right decisions.*

Equal Accountability and Culture of Learning - *Recommendation: Leverage transparency and a focus on improvement to reinforce the value of equal accountability and culture of learning.*

Table of Contents

ABOUT THIS REPORT	9
WHAT ARE WE EXAMINING?	10
LITERATURE REVIEW	12
METHODOLOGY	18
FINDINGS	24
CASE STUDY #1: WSU TRI-CITIES ACADEMIC BUILDING	25
CASE STUDY #2: SHC FOREST B EXPANSION	29
CASE STUDY #3: CCH MEDICAL CENTER	33
CASE STUDY RECAPS	37
RECOMMENDATIONS	43
FUTURE RESEARCH	45
REFERENCES	46
APPENDIX	47

About This Report

This report was developed to explore factors that contribute to a team's ability to collaborate through the lens of an architecture firm working on highly complex building projects utilizing emerging project delivery methods. Utilizing a case study approach to examine three projects of various sizes, complexity, market sectors and locations, this report developed recommendations in order to inform how the organization, projects, teams and individuals are executing leadership strategies that are intended to deliver collaborative outcomes.

What Are We Examining?

The rise of complex project-delivery models is changing previous relationships between architects, contractors and owners. Architecture firms have been historically organized and managed to meet the demands of owners - responsible directly to the project originator and a tangential relationship to the general contractor. With the rise of IPD Integrated Project Delivery (IPD), Collaborative Project Delivery (CPD), Design-Build (DB), and other organizational methods, this arrangement has fundamentally changed.

Architecture firms must now relate to each project and associated partners differently, with varying levels of responsibility and risk, and increasingly complex expectations. With multiple project delivery methods currently used in the industry, architectural firms must ensure their project teams can be effective in a variety of new working environments. These architecture project teams must both perform their disciplinary work, but also relate to much larger interdisciplinary teams and respond to different types of project demands. These teams must also maintain the core values of the firm and the larger profession.

This research seeks to understand how three project teams within a single architecture firm (Zimmer Gunsul Frasca - ZGF) are responding to these new project delivery methods. By focusing on leadership strategies and team outcomes, this work will explore how three key ingredients found in previous research – clear roles, clear objectives and equal accountability (Cheng, Integration at Its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector, 2015), are being employed and how they influence effective team formation. The findings of each case study will reveal opportunities for improvement on these complex projects.

Firm, Teams & Individuals

Zimmer Gunsul Frasca (ZGF) is a large, architecture and interior design firm based in the Pacific Northwest, with offices in Los Angeles, New York, Portland, Seattle, Vancouver, Canada, and Washington, DC. Their design portfolio spans diverse typologies including corporate and workplace, commercial and mixed-use, healthcare and wellness, scientific research and planning, higher education and urban design.

The firm places teams, and teamwork at the center of their practice, striving “to support a culture of cross-pollination and collaboration, empowering our teams to problem-solve in a holistic way.” The firm utilizes several approaches to support team formation and leadership across all projects including data driven approaches to communicating and tracking results and team building exercises based on development and sharing of project objectives.

Yet given the size of the firm and the range of projects, each **ZGF Project Team** has a different size, composition, and scope of roles and responsibilities that requires an adaptive approach. ZGF has developed their own guidelines, called the “Red Book”, so “each member of the firm will gain a better understanding of ZGF’s unique mission, philosophy and methodology” (ZGF

Architects, 2017). The guidelines have evolved from the broad spectrum of project delivery possibilities and best practices, and is intended to be a starting point for project teams.

Projects are challenged to find the appropriate balance between the workings of the internal ZGF Project Teams and external partners. This interface is embodied by the **ZGF Project Manager/Principal-In-Charge**, who is charged equally with supporting internal work and maintaining alignment with external consultants, contractors, owner's representatives and other larger **Project Team** members.

Traditional disciplinary separation has made the boundaries between individuals working in different capacities, or with different firms, hard to cross. Responsibilities and allegiances stayed with the employing firm, rather than to the project as a whole. Emerging project delivery methods, however, encourage and require a shift in perspective, mandating consideration of not only "what's good for the firm?", but "what's good for the project?" (Cheng, Integration at Its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector, 2015)

Thus the boundaries, or edges between entities become really important in successful project delivery. What once was hard, is now permeable, soft, thick...

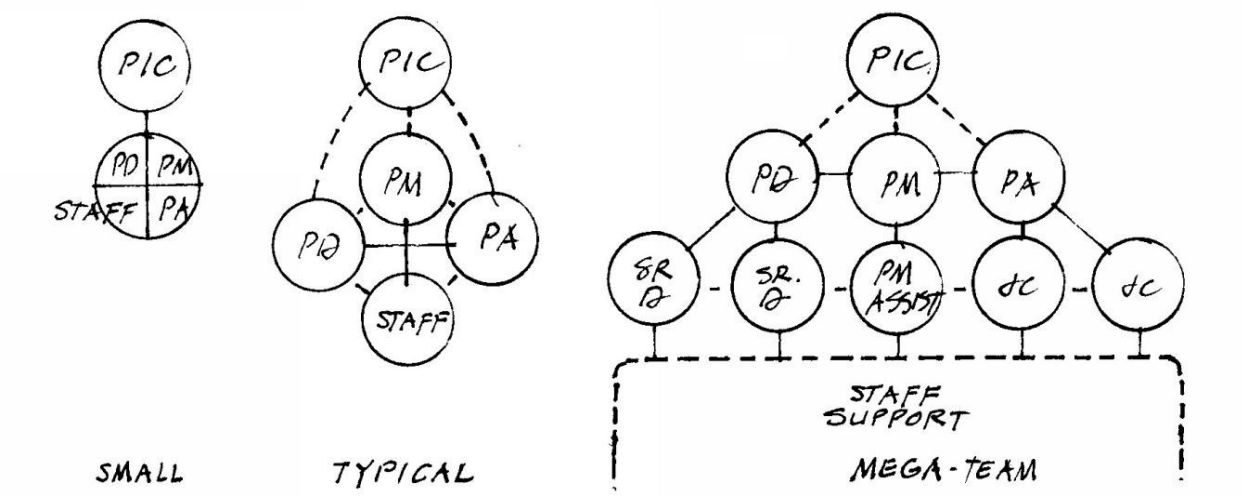

Figure 4 - ZGF Team Structure (ZGF Architects, 2017)

Literature Review

Work Groups and Teams

This research focuses on teams and leadership strategies in a design organization that develop collaborative outcomes and with knowledge developed by previous research influencing the framework for how the case studies are examined. This includes basic definitions of work groups and teams and how factors like task interdependence, team composition, formation and leadership are relevant in their context. With the organization working in the building industry that has a history of participating in projects trying to utilize more collaborative delivery methods, examination of team structures and strategies unique to these categories provide potential approaches to formation. Further looking for potential overlaps and verification of effective teams, the research on teams at Google highlight the opportunities and challenges with comparing findings.

In order to examine how teams work in a design organization, an understanding of work groups and teams is needed to identify the context that can should be identified in its relation to collaborative team outcomes. By using the highly regarded research on work groups and teams by Steve Kozlowski, Bradford Bell, and Daniel Ilgen, certain characteristics can be identified that can help define the case studies to be examined and the role of leaders in the functioning of teams.

Outlining how work groups and teams are examined deserves basic definitions as the boundaries that constrain and influence the exchanges within and outside the broader entity requires organizational context (Kozlowski & Bell, Work Groups and Teams in Organizations: Review update, 2013). The nature of these work teams and groups needs to meet simple criteria such as having two or more individuals who exist to work on interdependent tasks that support common goals. Certain organizational boundaries can be overcome by certain work flow systems and structures that provide interactions among work group individuals to achieve team effectiveness (Kozlowski & Bell, Work Groups and Teams in Organizations: Review update, 2013).

The application of systems and structures to enhance the team dynamic are relevant to the complexity of the characteristics of the team, the internal and external coupling with other individuals and groups as well as the task environment and interdependence. The teams being examined in this research match the characteristics of “complex” as the tasks are external driven, roles that are based on specialized knowledge and skill, and the coordinated individual and performance required in real time, to name a few (Kozlowski & Bell, Work Groups and Teams in Organizations: Review update, 2013). With a dynamic task environment that involves external and internal coupling while maintaining workflow interdependence, these features identify key contingencies to maintain effectiveness of these unique types of teams.

An assessment of team composition allows for the research to define characteristics of the team, including team size, demographics, knowledge skills and abilities, and personalities that could possibly help with understanding configurations of an effective team. Team size is

considered as research has shown this is contingent on tasks and the team environment that they operate in as well as create unique coordination challenges affecting performance and motivation. These characteristics can reveal how human resource systems are managed at the team level and how the combination of team member characteristics can be used to complete the tasks at hand (Kozlowski & Bell, Work groups and teams in organizations, 2003).

Team formation, socialization, and development can help with understanding how the individuals and groups who are part of the organization and project team are able to exist in these compositions. Teams that have a history of working with each other can leverage their shared experiences to create a relatively stable understanding of role expectations, norms and systems of knowledge. Challenges do exist in assimilating new members to experienced groups but research has shown that newcomer role development quality can predict role outcomes and their fit within a team. Depending on the familiarity of the individuals and groups, teams will go through a development stage as they learn to work with each other to achieve the appropriate pace, tempo and cycle of team activities to produce an effective performance (Kozlowski & Bell, Work groups and teams in organizations, 2003).

In order to develop the group performance required to deliver a common objective, the development of a cohesive team remains critical. Multiple factors have been suggested to affect cohesiveness including member interaction, work settings, group pride and task interdependence. What is known is that team cohesion is related to team performance and this relationship can strengthen as workflow interdependence increases and requires greater coordination of effort and information (Kozlowski & Ilgen, Enhancing the Effectiveness of Work Groups and Teams, 2006).

These are the basic definitions that will be applied to examine the work groups and teams at ZGF Architects and the projects that will serve as the case studies. The primary focus will be on the project teams staffed by ZGF and their internal and external partnerships. Revealing how these unique combinations are able to create collaborative team outcomes will depend on a multitude of factors including task interdependence, work experience, team composition, formation, socialization and development. How these elements are then shaped to create a more effective team will be dependent on the strategies being implemented and the functional role of team leaders.

Leadership and Team Effectiveness

The role of leadership and team effectiveness is voluminous and subjective. While there is evidence indicating the importance of leadership influencing team outcomes, the findings are mostly based on individual perceptions of their leader's effectiveness and not on the team performance. While more research on leadership needs to focus on the team-level outcomes, the heavily researched domain does indicate potential value in leadership's influence on team effectiveness (Kozlowski & Ilgen, Enhancing the Effectiveness of Work Groups and Teams, 2006). This research will parse the subject by exploring the individual role of the leader and strategies utilized to create more collaborative team outcomes.

The role of individual leaders in the teams examined in this report can apply to the internal teams at ZGF as well as working with the external partners on building projects. This may include developing individual skills within the team but also the promotion of teamwork skills necessary to deliver coordinated efforts with project stakeholders (Kozlowski & Bell, Work groups and teams in organizations, 2003). The skills to navigate the complex nature of building projects are buried in the context of the project and need to be dynamic to adjust to the unique tasks that each project presents. Training and knowledge of leadership skills are available and technology is making it possible to simulate situational experiences are being developed. Provided the complicated, unique and often expedited nature of delivering building projects, the unlimited scenarios that need to be managed seem to suggest a more situational approach to leadership (Northhouse, 2019). As researchers continues to explore what skills are needed by individuals to lead teams, there is agreement that these leaders do impact team effectiveness (Kozlowski & Ilgen, Enhancing the Effectiveness of Work Groups and Teams, 2006).

These attributes also directly align with the findings of *Google's Project Aristotle.* This project looked at over 18 internal project teams (within a single firm), but within a tech-based environment. This research found that what really mattered was how the team worked together, listed in order of importance: psychological safety, dependability, structure & clarity, meaning, and impact. Placing psychological safety aside, the four characteristics appear to align with three attributes being explored in this research: Clear Roles (Structure & clarity), Clear Objectives (Meaning & Impact) and Equal Accountability (Dependability) (Google, 2020).

Collaborative Project Delivery

The vast diversity of building projects can create an equal variability in theories of approaches and leadership strategies to develop collaborative outcomes. The project approaches this research seeks to examine are associated with supply chain integration practices (SCIP) that organize people, processes and information for more collaborative cooperation. This can include multiparty contracting agreements like design-build and integrated project delivery (IPD), lean construction practices like target value design and Last Planner® System, and early stakeholder participation.

High-performance buildings have been identified as candidates that could benefit from SCIP like IPD that seek to develop a facility that creates synergy between the technical systems and stakeholders (Fischer, Reed, Khanzode, & Ashcraft, 2014). The types of projects that ZGF services that would likely qualify as these high-performance buildings would include healthcare, higher education and laboratories and they have documented approaches like "Lean Design" included in their company handbook (ZGF Architects, 2017). The organization has a documented history of participation in academic research examining collaborative projects strategies (Cheng, Integration at Its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector, 2015) and various approaches including incentive based contracting and teaming agreements. In order to categorize the approaches that can be associated within the larger category of SCIP, this research will simply qualify this as Collaborative Project Delivery (CPD).

Leadership Strategies & Collaborative Outcomes

In order to discover potential leadership strategies that address the unique scenarios presented in building projects that are also focused on collaborative team outcome, this work will expand on previous research that examined complex project delivery models and team effectiveness. In Professor Cheng's 2015 reports, *Integration at Its Finest,* researchers focused on the General Services Administration (GSA) in the "owner" role on three complicated projects and addressed leadership strategies thought to create more collaborative outcomes with the interdisciplinary project teams. In 2016, Professor Cheng used a similar approach in *Teams Matter* to examine 11 additional GSA funded projects. Based on interviews and surveys with the leadership of the project teams, both reports were able to make broad recommendations as to Commercial Strategies, Leadership Strategies and Logistical & Process Tactics.

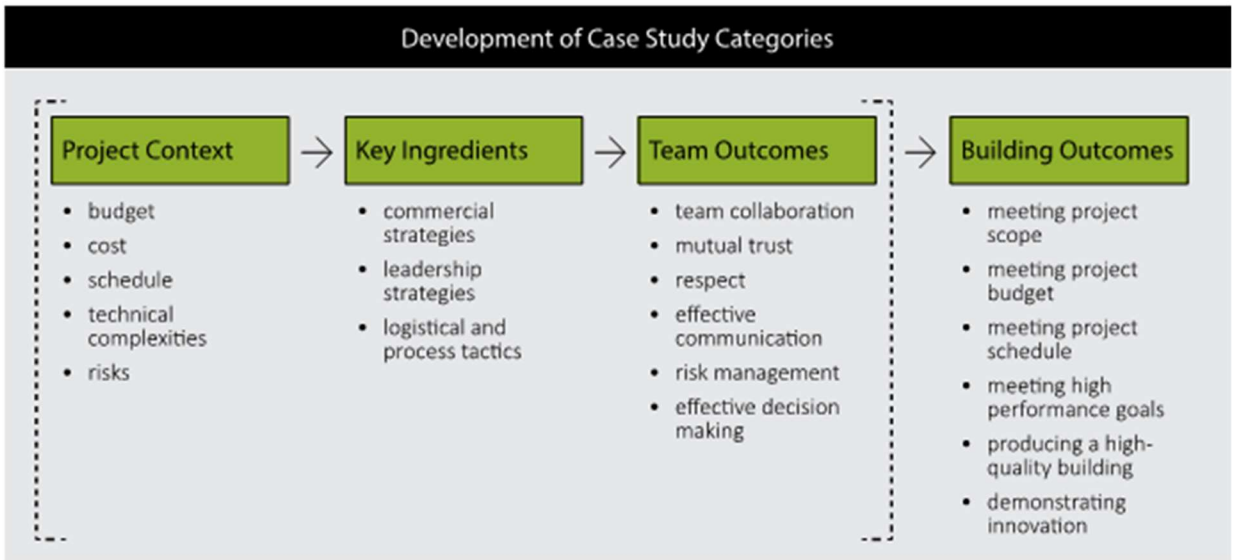

Figure 5 - Development of Case Study Categories from "Integration At Its Finest" (Cheng, Integration at Its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector, 2015)

The reports detail the development of case studies with their applicable theories and analysis to show the possible links between key ingredients and outcomes. Case study categories, based project context, key ingredients and team and building outcomes were further detailed to show leadership strategies and team collaboration. These strategies and outcomes were based on theories on management and social science that included partnering, swift trust and framing and this was the framework that guided the data collection. Leadership strategies, such as clear roles, clear objectives and equal accountability were mapped for potential relationships with collaborative outcomes like trust and respect, alignment and effective communication.

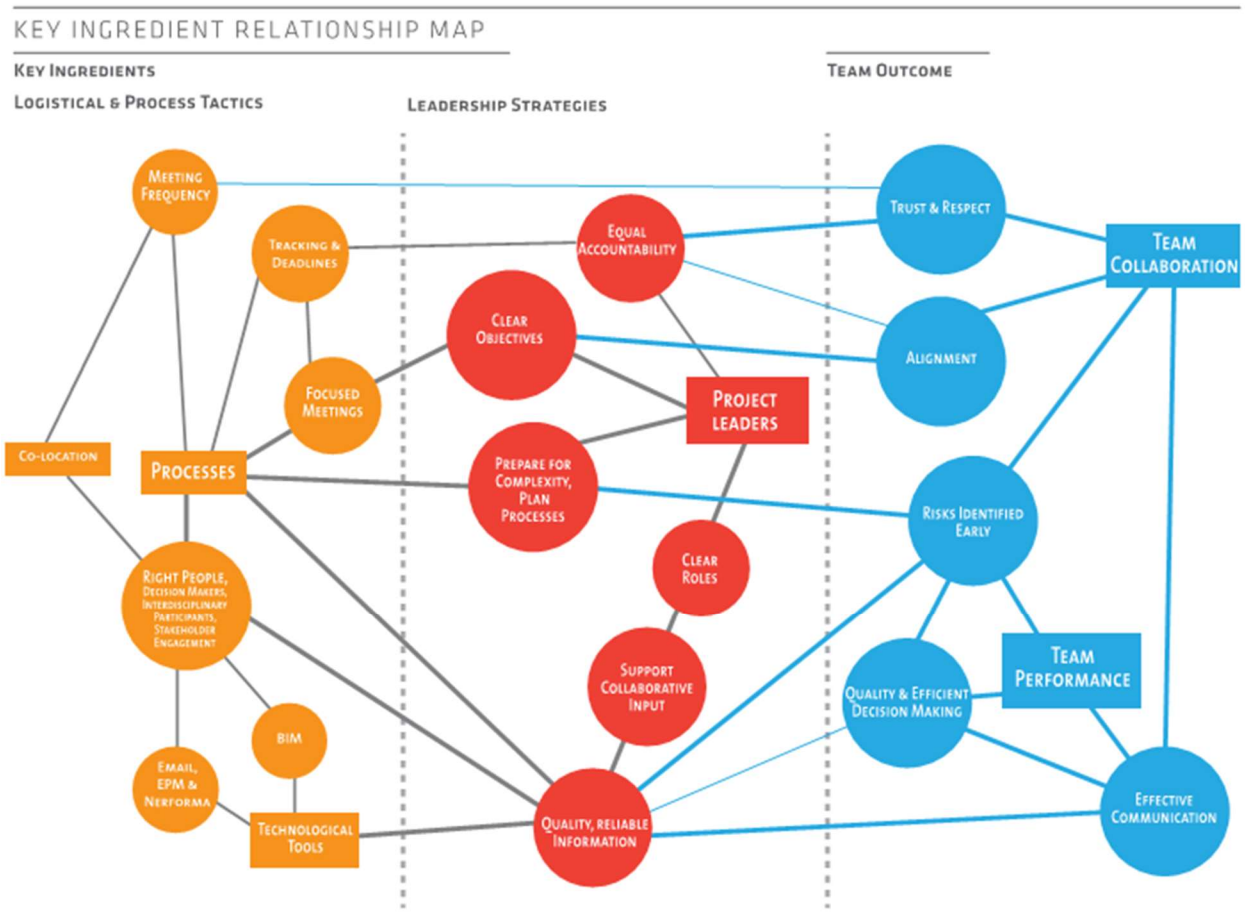

Figure 6 - Key Ingredient Relationship Map from "Teams Matter" (Cheng, Teams Matter: Lessons From ARRA, 2016)

These reports also detail the commercial strategies of the case studies and several of the contracting agreements resembled IPD agreements. This integrated delivery model is targeted towards more complicated projects that require more collaborative engagements by creating an intersection of owner business objectives, financial goals and team culture. Building a successful IPD team is marked by the same collaborative team outcomes like mutual respect, alignment and effective communication and strategies to establish this team culture include “big room” meeting spaces, measuring team performance, team check-ins and creating a learning environment (Integrated Project Delivery: An Action Guide for Leaders, 2019). This provides further understanding of potential strategies for collaborative outcomes that are associated with the case studies in the previous reports.

Based on this previous research, three key attributes that are associated with leadership strategies and collaborative outcomes have been identified that directly apply to the particular challenges of teams working within complex project-delivery models. These attributes are:

> Clear Roles: the communication and understanding of the part each individual plays on a large complex project. The knowing and appreciation of each individuals’ contributions, and the importance of those contributions has been shown to be a core part of effective teams.

Clear Objectives: the shared vision among team members that the overall work and specific project tasks lead toward specific goals, outcomes and/ or results. Even though each team member has a unique position and background, a shared clarity in the objectives is important.

Equal Accountability: the understanding that once roles and objectives are established and shared, team members are held equally responsible for completing their individual work, and contributing to larger project outcomes.

Literature Review Takeaways

The research on work groups and teams provides a basic framework of how these projects can be examined as it relates to how organizations, projects and individuals are coupled to work on interdependent tasks. By focusing on the leadership position and industry related case studies that examined collaborative team outcomes, we were able to identify strategies that address key variables that include clear roles, clear objectives and equal accountability. Within this understanding, this report will develop a case study approach to dive further into the specific leadership strategies and project context to understand how the ZGF organization utilizes leadership and better develops its project teams to create more collaborative outcomes.

Methodology

With the focus of this research on leadership strategies and collaborative outcome, there is a need to understand complex social phenomena. A case study approach will allow for an in-depth investigation into the contemporary phenomenon within its real-world context where the boundaries are not clearly evident (Yin, 2018). The “natural” conditions of a building project can provide demarcation into the boundaries of a case study and offers a reliable comparison to past research that has also adopted this approach. Each project examined will represent an individual case study that can be compared against similar projects in order to identify the similarities or differences of approaches within the context of the project they are working on. The initial selection of the case studies was determined on projects utilizing collaborative project delivery methods, and then refined after an interview process with the project manager leading the ZGF project team.

A survey was also developed based on observational studies of the ZGF Seattle office and the interview responses to questions centered on how leaders were managing leadership strategies centered on clear roles, clear objectives and equal accountability and distributed to the project team. The survey responses are collected, documented and categorized by project, organization, team and individual and compared within and between the case studies. The findings and recommendations made from the case study data addresses potential leadership strategies that support collaborative project delivery for the organization and the further research opportunities.

Case Study Development

Initial Case Study Selection

The selection of case studies started with a larger body of potential projects utilizing collaborative project delivery (CPD) methods and then refined based on interviews with the project manager. The initial selections were based on projects that utilize collaborative methods that include contracts or teaming agreements similar to design-build and integrated project delivery (IPD), lean construction tools like Target Value Delivery (TVD) and Last Planner® System (LPS), and highly-complex building projects that require a larger interdisciplinary team.

Observational Study

A significant amount of research work was done in ZGF’s Seattle office and offered in-person observations of individuals, teams and their working spaces. This office space occupies two floors of a modern commercial high-rise building and offers a plethora of resources including access technology, training, and a community of experienced employees. The access to technology includes digital tools and computing power but also more traditional planning technology including planning calendars and story board designs. Several times a week, a multitude of training programs are offered to help employees build their knowledge, skills and abilities to deliver their task responsibilities and other topics including philanthropic, project

presentations and office business performance. The office working spaces consist of a combination of open office layout as well as meeting rooms for teams and private conversations and opportunities for ZGF to host meetings with project partner organizations.

Interviews

This project also focused on the essential work of the ZGF Project Manager - as an interface between internal and external teams. The researchers conducted several interviews to collect both specific project information and more general information about project workings.

Six individuals who were either a project manager or principal in charge (PM/PIC) of a project initially selected as a potential case study were interviewed in order to ascertain leadership strategies implemented with the project and ZGF team. The interviews were one hour in duration, recorded and transcribed. Conversations were focusing on how they create clear roles, clear objectives and maintain equal accountability on their projects. The interview was intended to resemble a guided conversation in order to gather personal views from the PM/PIC (Yin, 2018) and were given the list of questions categorized by the leadership strategies to review before the meeting. Most of the times the questions were asked verbatim but the conversations they would stimulate had their unique tangents that allowed for the PM/PIC to open up more freely about their experiences and opinions. The responses would then be used to develop a survey for the ZGF team and project leaders and determine the case studies that will be examined.

Of the six projects selected, this researcher had worked previously for the general contractor on three of them. By eliminating two of these projects, the four remaining were two healthcare and two academic buildings, both of similar size and scope. One of the academic building projects had already been completed and the other nearing the start of construction. It was decided to take the project that was currently active with the intent that the experiences the survey is examining would be fresher in the minds of the respondents.

The interviews of the three PM/PICs for the case studies that were eventually selected provided insight and variance between the leadership strategies employed by each. What was common in all three of the interviews was the acknowledgement that each had strategies to create clear roles, clear objectives and equal accountability with their ZGF project teams. A very common theme was the importance of meetings as a forum for the strategies and certain technology to share ideas that included digital data and calendar storyboards. Certain strategies did carry over to the entire building project team (the owner, general contractor, and design consultants) and were also being generated due to contracts and teaming agreements. There were differences in the hands-on needs from the leaders as the project that was more remote with less working experience between individuals and teams took more of an explicit teaming approach and the project that was located in the same city as the ZGF office who had an extensive working relationship with the external partners took more of a trusting planning program. The PM/PIC leading a design-build partnership with a general contractor they had limited experience working with relied more on past strategies that other leaders had handed down to them and programs

introduced through the organization like “hopes and fears” exercises explained to create a more cohesive team and alignment in project objectives.

Final Case Study Selection

The initial case study selection was whittled down to three to provide specific focus on which projects could provide the most valuable research value and work within resource constraints. The goal was to have similar project features including project type, size and complexity that can compare its approaches including leadership strategies and collaborative delivery strategies, explicit and implied. The ability to avoid research bias was also considered as the past experience of working with project teams needed to be considered.

Two of the projects selected for final examination were large healthcare projects that shared aspirations for collaborative outcomes. Each of these project staffed by ZGF was considered a “mega-team” according to ZGF’s company handbook (ZGF Architects, 2017) and the contract value for construction and design are both in the hundreds of millions of dollars. Both projects have ZGF being contracted directly to the project owner with each having their own explicit and implied teaming agreements. Each project is at a different stage of progress with both projects already into construction activities and are located in Seattle, WA and Cincinnati, OH.

The third case study that was selected was an academic building for a public university in the Tri-Cities region of the state of Washington. The project size is not nearly as large as the other two case studies and does not require high-performance building features that a hospital may require. However, the project does have scopes that require a high-degree of coordination with facility stakeholders and is utilizing a design-build agreement to achieve more collaborative outcomes.

The three projects that were not selected shared similar characteristics that could have qualified it for examination but ultimately were passed over for the following reasons. With this researcher having past experience working for the general contractor, two of the projects that had this condition were eliminated. An exception to this rule was made for one of the case studies as its project context was best matched for one of the other projects selected. The other initial case study is a completed project and not selected due to potential challenges with participant recall of past events.

Survey Development

The developed survey is based on previous research addressing team formation, leadership strategies and collaborative outcomes, via observational studies and the PM/PIC interview responses. Distribution of the survey for each case study included individuals from the ZGF project team and PM/PIC and leaders from project partner organizations including design consultants contracted with ZGF, the general contractor and construction management, and owner reps and building users from the organization developing the building project. The survey consists of 44 multiple choice questions that addressed the experiences of working on the current and past projects. Depending on who the participant works for and their role on the

project, they will be assigned a sequence of questions designed to take less than 15 minutes to complete, with clear and straightforward queries that do not give clues for any preferred responses. The multiple choice platform allows comparison of group and individual responses and possible choices for questions will be consistent for all participants. The survey was uploaded to Catalyst for pilot testing with non-pilot participants with industry and non-industry experience in order to determine relevance, timing, and clarity with the questions presented. Multiple rounds of pilot testing were completed and this level of scrutiny was intended to develop a survey that encouraged cooperative participation that yields responses that can be examined for interpretation relevant to the goals of this research project (Leedy, Ormrod, & Johnson, 2019).

The survey was designed allowed for distribution to multiple projects that can identify the individuals, teams and leaders that will be compared in each case study. The primary focus is on the ZGF PM/PIC and project team that consists of the individuals that are tasked with developing, distributing, coordinating and administering the design scope for the building project. Other project teams that are examined are design consultants (DC) who are contracted directly with ZGF, the general contractor and construction manager (GC/CM), and the owners and users who represent the organization developing the building project and participation will be limited to the leadership representing their group. These categories will assist in the identification of individuals and groups and possible influence of leadership strategies with collaborative team outcomes.

Survey participants are required to respond to questions that assess their experience of working on similar projects and the individuals on the project. Individuals who are more familiar working with each other may not require the same approaches to socialization required for team formation and even suggest a more hands off approach from leadership to encourage cohesion (Kozlowski & Bell, Work groups and teams in organizations, 2003). Evidence of experience affecting approaches on managing teams was echoed in a PM/PIC interview where the project team that had a history of working with each other did not see value in creating an explicit teaming agreement as the relationship was more “baked in” (Thompson, 2020). Familiarity of working with individuals, groups and organizations can be examined in the context of trust and how it applies to the various working relationships including in the organization and temporary groups (Kramer & Tyler, 1996). Several potential variables can be examined in questions addressing experience and is highly relevant when evaluating the relationships that exist within each case study.

In order to further examine the relationships with the project teams and individuals an assessment of task interdependency was included. To accomplish this, the participants were asked to describe the frequency of working with the other project teams being surveyed as well as their experience on previous projects. The responses can then be used to examine concentration of group interaction, either real or perceived, and compare with leadership strategies and work practices intended to help teams coordinate interactive tasks.

Individuals were also surveyed to examine where they work on their current and past projects. Co-location has been seen as a potential positive force with teams that have a strong team

culture as well as an essential investment for complex projects (Integrated Project Delivery: An Action Guide for Leaders, 2019). Working locations can be influenced by multiple factors including technical support and access to resources and this survey will quantify the percentage of time an individual works on the project, in their main office and remotely. The project timeline impacts the ability to work in onsite offices and participants are asked what design phase they started working on the project.

Questions developed to address leadership strategies were based on the interview responses and focused on the forums where clear roles, clear objectives and equal accountability are implemented. By asking the participants to rate the frequency of communication using forums such as project meetings, shared digital programs, physical documents and 1-on-1 conversations to track plans, priorities, task progress, scopes, roles, responsibilities, goals, and project objectives. The collection of responses from the ZGF project team is compared with leadership responses to possibly understand how the various strategies being implemented by the ZGF PM/PIC aligns with how other individuals are perceiving it. Additionally, responses that could suggest a popular forum could provide a focus on where to improve facilitation of collaborative outcomes based on the leadership strategy to which it applies.

With a purposeful focus of this research on individual leaders of these project teams, PM/PIC's will be asked additional questions focused on experience with the organization and the design industry and project specific inquiries into team formation and sharing of budgets and schedules. These questions are intended to examine potential influences in team development including timeline and selectivity of team. With the observed culture of sharing in the ZGF Seattle office, questions regarding sharing with project partners are posed to examine its prevalence beyond their downtown location. The responses are meant to provide context to any influences of individual leadership strategies within each case study as well as a group that represent the culture of an organization.

The findings from these surveys will be collected and examined to help support recommendations for leadership strategies that support collaborative outcomes. ZGF project team responses will use a heat map to communicate individual's evaluations for leadership strategies, working locations and task interdependency to better visualize and communicate agreement and contrast in responses. Considering the responses from leaders and the context of the case study, these solutions will be based on the unique conditions of the ZGF organization but with the intent to be informative for various organizations seeking strategies for more collaborative team outcomes.

Survey Distribution

The survey was distributed to the three selected projects and participants included the ZGF project team members and PM/PIC and leadership from project partners including design consultants, GC/CM and owner and user representation for the organization developing the building. The survey was uploaded to Catalyst where online submission. Over three weeks, 42 responses were collected that included 24 ZGF employees, 7 individuals who represent

GC/CM's, nine from design consultants and two owner's reps. Results were collected within a single database.

Findings

The findings from the survey have been collected to examine the individual responses as they are related to team formation, leadership strategies and collaborative outcomes. This data utilizes graphics like heat maps to represent the collection of responses on each project and relative context including working experiences with individuals throughout the project and organizations.

Case Study #1: WSU Tri-Cities Academic Building

Project Context:

Case Study Context	WSU Tri-Cities Academic Building
Project Location	Richland, WA
Project Value ($)	$23,000,000.00
Project Type	Academic/Institutional
Project Start Date for ZGF	January-19
Project Completion Date	May-21
Current Stage of Project	Construction Administration
# of ZGF Design Consultants	4
Project Owner/User	Washington State University
Project CM/GC/Trade Contractors	Hoffman Construction Company

Table 4 - Case Study #1 Project Context

Project Delivery Method/Contract Formation: The general contractor and architect joined as a design-build team to pursue the WSU Tri-Cities Academic Building “progressive design-build” project. The DBIA contract with WSU included obligations from preconstruction through occupation of the building and design-build arrangements like a KPI plan, the guaranteed maximum price development and subcontracting processes to name a few.

Team Formation Documents: The initial teaming agreement with ZGF and Hoffman to pursue the project communicated the intent of mutual interest of each party and that future contracting alignment will be driven by the WSU contract. This agreement also clarified reimbursement of the fees during the programmatic and design development period as well.

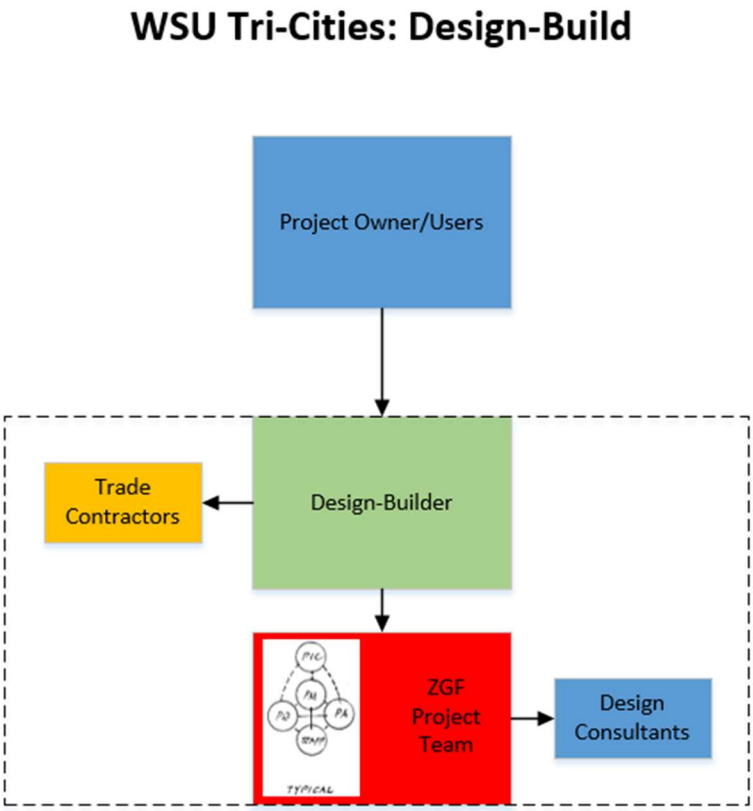

Figure 7 - Case Study #1 Project Delivery Formation

Survey Findings & Takeaways

Working Locations Takeaways: With the majority of activities in preconstruction phases, working at an onsite office is highly unlikely. That does not excuse exploring working locations for project teams on similar projects and opportunities could exist for creating project working sessions for teams that have a high frequency of task interdependence.

Task Interdependency Takeaways: There appears to be a higher frequency of task interdependence with the design disciplines as well as the project team as a whole. A change in frequency with the GC working with the ZGF project team is apparent and could suggest that team formation strategies, like the design-build contract, created this higher rate of task interdependence.

Clear Role Takeaways: 1-on-1 meetings appear to be the most frequent way that the ZGF project team communicate scopes, roles and responsibilities and shared digital programs when working with the design consultants and entire project team.

Clear Objectives Takeaways: The ZGF project team and PIC had strong agreement with the frequency of using 1-on-1 meetings “often” to discuss project goals, objectives and visions and all the responses from leadership from all teams, including the PIC, indicated that project meetings were the more frequent forum.

Equal Accountability Takeaways: The responses are scattered but 1-on-1 meetings are the most frequent with all teams, with an increase in use with group messages that are as equal or greater to project meetings. The PIC and DC leadership have agreement with the frequency of 1-on-1 meetings and the ZGF project team, the responses from the leaders showed more alignment in their responses for a higher frequency of utilizing the project meeting forum.

Project Team Experience Takeaways: The project team has a mix of experience working with ZGF and PIC with the ZGF project team, DC and owner/user leadership being the most familiar. Where the GC leadership lacks familiarity with the design team, their responses do indicate that they do have experience with other project team members who were not surveyed. All but one of the ZGF project team and PIC have worked with each other and everyone has experience working for the ZGF organization. Half of the responses from the ZGF employees indicated participating with other groups within the ZGF organization and only one individual attended industry group meetings.

Project Start Takeaways: There were mixed responses to when people started on this project and how that changed from past projects. The responses from the ZGF project team indicated a later project start date but the PIC and DC indicated they started earlier.

ZGF PIC Takeaways: Abilities and experience is of high value for assigning project roles and “sometimes” to select their preferred individual. Sharing information associated with budgets and schedules “often” occurs with most of the project teams.

SURVEY TAKEAWAY: The majority of the project team has been working in the preconstruction phase so the working locations are limited in the ability to be onsite and task interdependency is highest with design disciplines but an increase has been seen with the general contractor. The most frequent forum within the internal ZGF project team and also the design consultants for all leadership strategies are the 1-on-1 meetings and project meetings are more common with the project team as a whole. The ZGF project team and PIC have experience working with the design consultants surveyed and the general contractor has a larger familiarity with project team members as a whole than other groups. Responses from the ZGF project team indicated a later start on the project while the responses from most of the leaders showed evidence of an earlier than typical project start.

Case Study #2: SHC Forest B Expansion

Project Context:

Case Study Context	SCH Forest B Expansion
Project Location	Seattle, WA
Project Value ($)	$165,000,000.00
Project Type	Healthcare
Project Start Date for ZGF	January-17
Project Completion Date	July-20
Current Stage of Project	Construction Administration
Project Owner/User	Seattle Children's Hospital
Project CM/GC/Trade Contractors	Sellen Construction

Table 5 - Case Study #2 Project Context

Project Delivery Method/Contract Formation: ZGF and the general contractor signed separate agreements with the project owner with a development manager assisting the owner in carrying out project management and construction oversight. Responsibility to manage costs with contractors and owner consultants is called out and the construction budget is included as well.

Team Formation Documents: A draft form of an IPD agreement was found in the project files but an executed document was not located. In the interview with the PIC, it was explained that the team would be working with an implicit trust built on seasoned working relationships between ZGF, the owner and the general contractor. The project team had facilitators who utilized lean construction tools like target value delivery and pull planning activities. The design development with the hospital users was done with these lean principles as well and several of the planning sessions have been documented in the project files.

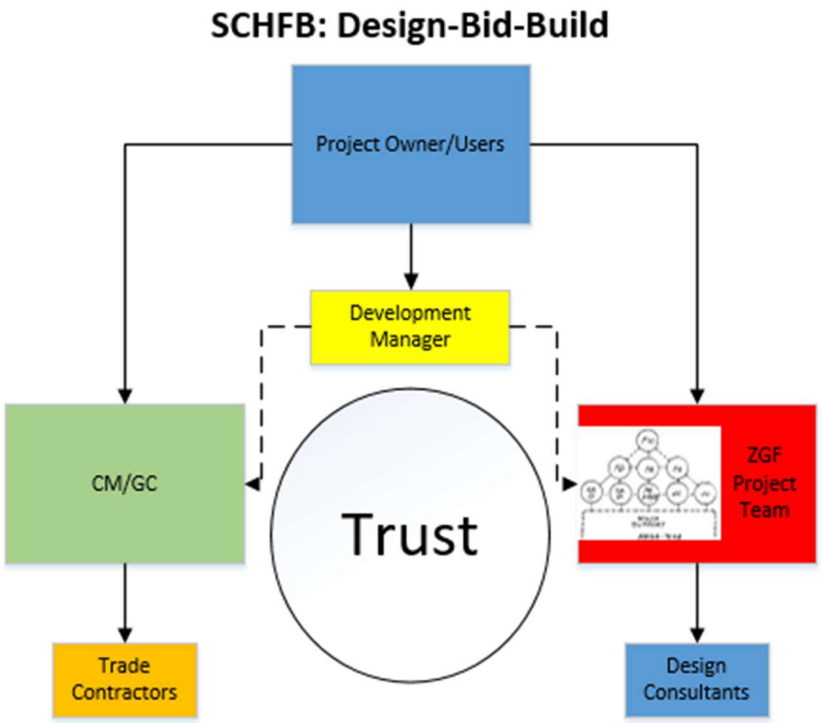

Figure 8 - Case Study #2 Project Delivery Formation

Working Locations Takeaways: The responses from the design disciplines indicate that the main office is the more frequent work location and the leaders from the GC worked more frequently onsite. There was evidence of a slight increase of working from the main office based on a few responses from individuals from ZGF and the GC.

Task Interdependency Takeaways: The design disciplines showed the highest frequency of task interdependency and an increase with this project versus past experience. There was a slight decrease in task interdependency with the ZGF project team and the owner/users, the project team as a whole and the GC/CM with a leader from the GC reflecting this as well.

Clear Roles Takeaways: 1-on-1 meetings appear to be the most frequent forum with the design disciplines with project meetings also being very common as well. The other forums had scattered support although when addressing the project as a whole the project meetings had the most apparent support.

Clear Objectives Takeaways: There was agreement on frequency for most of the forums with the highest frequency being for project meetings with all groups. “Often” as a frequency for 1-on-1 meetings exists within the ZGF project team and there was a wide range of responses with team building exercises that could indicate selective participation in these activities.

Equal Accountability Takeaways: Project meetings and group message applications were the most frequent forums for the internal ZGF project team with a similar frequency with the DC’s. The project team as a whole had a higher frequency of these same forums as well with leadership responses reflecting similar responses as well.

Team Experience Takeaways: The responses from all but one of the individuals has indicated they have experience working with ZGF and all project teams surveyed had at least worked with one other person from an external team on the project with several responses indicating knowing over 6 individuals. The ZGF project team responses showed a mix of experience with working at ZGF and with individuals on the team. Almost half of the ZGF responses were from people who have worked for the company for over 10 years but over half of those surveyed knows 1-2 people or less within their internal ZGF project team. This trend of mixed experience also was apparent with those who have worked with the PIC on a past project. Most of the ZGF responses indicated that they meet with other groups within the ZGF organization and the greater industry as well.

Project Start Takeaways: Responses from the ZGF project team indicate a later start on this project and no change with the PIC and the DC leadership. One of the responses from the GC relayed an earlier start for that individual.

ZGF PIC Takeaways: The PIC puts a high value with skills and experience for determining roles and has often been able to assign on a project. Sometimes budgets were shared with the project groups with a higher frequency with the owner/users and GC/CM with developing the project budget. Participation with the project schedules was variable but sharing with the GC/CM had the highest frequency of “all of the time.”

SURVEY TAKEAWAY: Work locations appear to be divided between design and construction tasks as the ZGF project team and design consultants have a high frequency of working in the main ofices and the GC at the onsite project office. Task interdependency appears to be most frequent with design disciplines and increasing on this project while that has decreased with the general contractor, owner/users and project team as a whole. Forums for communicating leadership strategies appear to have a high frequency of using 1-on-1 and project meetings with the former being more common for clear roles and the later for clear objectives. Equal accountability had a higher frequency of being communicated in project meetings and group message applications also had evidence of a higher frequency as well. Several individuals across all teams had a high amount of experience including years working for their organization and working with other individuals to mix with people who were not as familiar on both fronts. There was a later project start than typical for multiple ZGF project team members with one leader from the GC indicating an earlier start.

Case Study #3: CCH Medical Center

Project Context:

Case Study Context	Case Study #3
Project Name	CCH Medical Center
Project Location	Cincinnati, OH
Project Value ($)	$565,000,000.00
Project Type	Healthcare
Project Start Date for ZGF	May-16
Project Completion Date	July-21
Current Stage of Project	Construction Administration
# Design Consultants	17
Owner/User	Cincinnati Children's Hospital
GC/CM	Messier

Table 6 - Case Study #3 Project Context

Contract Formation: The process of how to deliver this project was a first of its type at CCHMC for the last 25 years but consistent with RFP's issued. The owners met with ZGF, the associate architect contracted through ZGF and the general contractor and decided the most preferred contract formation with these partners was a CM at risk with CPD rider where the designer and contractor would have separate agreements with the owner.

Team Formation Documents: A CPD rider, also referred to as a CPD addendum, coordinated with the contract included expectations and behaviors, best practices, profit at risk/incentives based on the Conditions of Satisfaction including overall project goals, common design-construction goals, individual firm/company goals, and collaborative efforts to ensure mutual achievement of individual goals, strategies for design and construction contingencies and an incentive pool and a GMP strategy including definitions, timing and disposition of buy-out savings. Lean principles and collaboration tools, such as BIM and pre-fabrication opportunities, were listed in the agreement and a CPD leadership team that includes the owner, architects and GC with provisions to include the structural engineer and MEP trade contractors. Communication protocols included technology sites that should be used for sharing information and a project value analysis strategy was detailed to help create additional value for the owner. There was an agreement to share digital designs within a BIM model including program requirements, processes for quality control and documentation process.

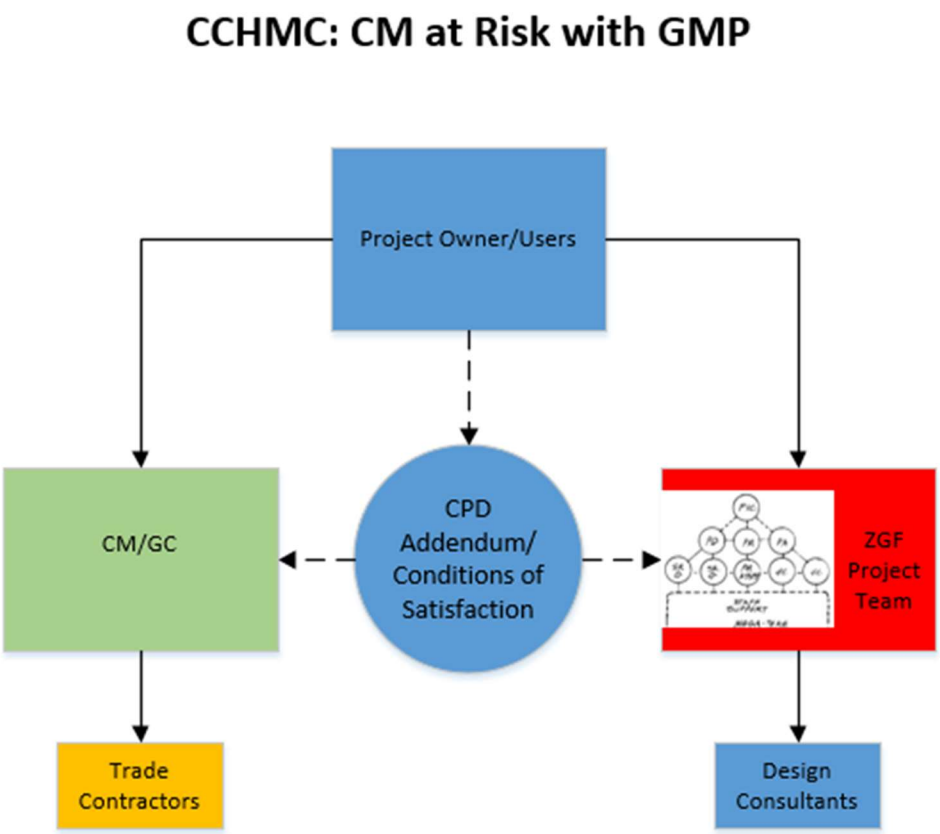

Figure 9 - Case Study #3 Project Delivery Formation

Project Survey Takeaways:

Working Locations Takeaways: The design staff tended to work more in their organizations office with one individual working most of the time onsite and three individuals only spending at most 60% of their time in the main office. This is the largest contrast of all the three case studies. The GC leadership mostly worked from the onsite office with the owner split between the three locations that included remote. Four responses, including one each from a DC and GC leader indicate that they work more onsite than on similar projects and the PIC spent time working from each location.

Task Interdependency Takeaways: The design disciplines had the highest frequency of task interdependency and several responses indicated an increase of task interdependency from typical projects with all groups and leaders but a slight decrease with owners/users and the project team as a whole. The responses that indicated the largest increase in task interdependency was from the PIC working with the design consultants and GC/CM and a GC leader working with the ZGF project team.

Clear Roles Takeaways: The frequency overall for communicating clear roles was commonly "often" for many forums including an "all of the time" use within the ZGF project team to use group message applications. 1-on-1 meetings had the highest frequency with communicating clear roles with the design consultants and project meetings were used often with all internal and external teams but was the most frequent forum with the project team as a whole. The PIC responses agreed with several others on the ZGF project team and the DC, GC and the owner/users leaders also had alignment with these responses when it related to the higher frequency of using 1-on-1 and project meetings.

Clear Objectives Takeaways: The ZGF project team indicated that project meetings are "often" the forum to communicate project goals, objectives and vision internally and with external groups as well. There was support for all forums with the design disciplines but with the project team as a whole the collection of responses made a more isolated distinction to a higher frequency with project meetings. The PIC and leaders responses appear to match the trends across the forums and there was a scattering of responses using team building exercises.

Equal Accountability Takeaways: The design disciplines show high frequency for using project meetings and 1-on-1 meetings with also shared digital programs being "often" used by the ZGF project team. The responses from the PIC and leaders' trend more towards project meetings and 1-on-1 meetings but the ZGF project team had a more scattered response to the frequency of all forums with the project team as a whole.

Team Experience Takeaways: Only three had not worked with ZGF on a past project and all the leaders have worked with at least two others on the project and four of them with 11+. Some of the ZGF responses indicate little to no experience with the ZGF or the project team but most of the individuals indicate knowing others on their internal and external project teams. Most of the ZGF responses had worked for the company for 6 years and work with other ZGF

and industry groups. The PIC has a lot of experience working for ZGF but only 3 of the 9 ZGF project team responses indicate working with her in the past.

Project Start Takeaways: There was a slight change in a later project start for some of the ZGF project team and one of the design consultants. Most of the responses indicate that they typically start during pre-design.

ZGF PIC Takeaways: The PIC evaluates skills more than experience with assigning roles and is often able to select the people they prefer. Sharing of accounting, scheduling and the budget is often with all groups but the response of “rarely” for the participation of creating the budget for the ZGF Project Team and the GC/CM stands out from all the response received from PIC’s to this same question.

SURVEY TAKEAWAYS: There is more onsite participation from the ZGF project team and that is more likely due to it’s remote location from the main office in Seattle. The task interdependency with the design disciplines continues but there is evidence of an increase with the GC’s tasks. There was a rise in using group message applications in communicating clear roles with the ZGF project team and as project meetings were the most frequent forum for communicating roles and objectives with the project team as a whole. The responses for equal accountability showed that project meetings were more frequent with the ZGF project team but forums for communicating this with the project team were more scattered across forums with less frequency. The ZGF team has experienced individuals throughout their team along with individuals who have none. The responses from the project team as a whole indicate they know several project members as well. Only three responses indicated they had worked with the PIC despite this person working for ZGF for several years. The PIC is often able to select the roles for the project team and puts more value on skills than experience. There is a high amount of sharing done on the project with accounting, budgets and schedule development except for ZGF and the GC/CM in the budget development.

Case Study Recaps

Case Study #1 – Team Formation Context and Graphic

Working Locations

Working Location	Occupying Team(s)
Main Office	Project Team as a Whole (all of the time)
Project Office	NA
Remote	Project Team as a Whole (rarely)

Team Experience

Team Formation Context	WSU Tri-Cities
ZGF Team Experience	New & Experience
Project Team Experience	New & Experienced
PIC Experience	Experienced with ZGF, sometimes choses ZGF roles
Project Start Timeline	Slightly Later

Leadership Strategies

Leadership Strategy	Collaborating Group	WSU Tri-Cities	
		ZGF Project Team Frequent Forum	PIC's Frequency of Use
Clear Roles	ZGF Team	1-on-1 - Often	Rarely
	DC	Shared Digital - Often	Sometimes
	Project Team	Shared Digital - Often	Sometimes
Clear Objectives	ZGF Team	1-on-1 - Often	Often
	DC	Project Meetings- Often	All of the time
	Project Team	1-on-1 - Often	Often
Equal Accountability	ZGF Team	1-on-1 / Group Messages - Often	Often/Often
	DC	1-on-1 - Often	Often
	Project Team	1-on-1 - Often	Often

WSU Tri-Cities Team Formation Graphic

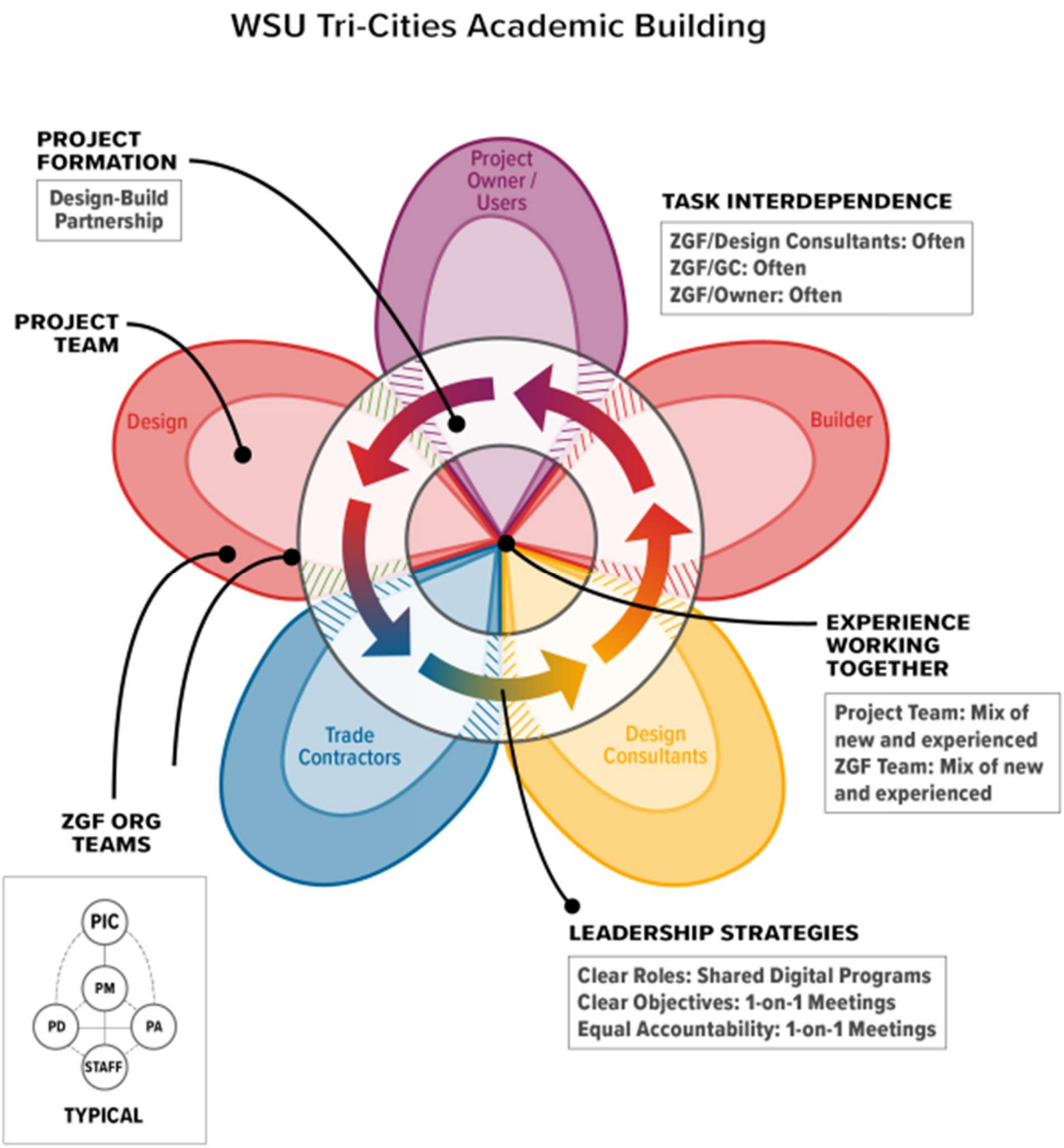

Figure 10 - Case Study #1 Recap

Case Study #2 – Team Formation Context and Graphic

Working Locations

Working Location	Occupying Team(s)
Main Office	ZGF & DC (all of the time)
Project Office	GC (all of the time)
Remote	ZGF & DC (rarely)

Team Experience

Team Formation Context	SCH
ZGF Team Experience	New & Experienced
Project Team Experience	Mostly Experienced
PIC Experience	Experienced with PT, often chooses ZGF roles
Project Start Timeline	Slightly Later

Leadership Strategies

Leadership Strategy	Collaborating Group	SCH	
		ZGF Project Team Frequent Forum	PIC's Frequency of Use
Clear Roles	ZGF Team	1-on-1 - All of the time	Sometimes
	DC	1-on-1 - Often	Sometimes
	Project Team	Project Meetings - Sometimes	Sometimes
Clear Objectives	ZGF Team	Project Meetings - Often	Often
	DC	Project Meetings - Sometimes	Often
	Project Team	Project Meetings - - Sometimes	Sometimes
Equal Accountability	ZGF Team	Project Meetings / 1-on-1 - Often	Sometimes/Sometimes
	DC	Project Meetings - Often	Sometimes
	Project Team	1-on-1 - Often	Sometimes

SCH Team Formation Graphic

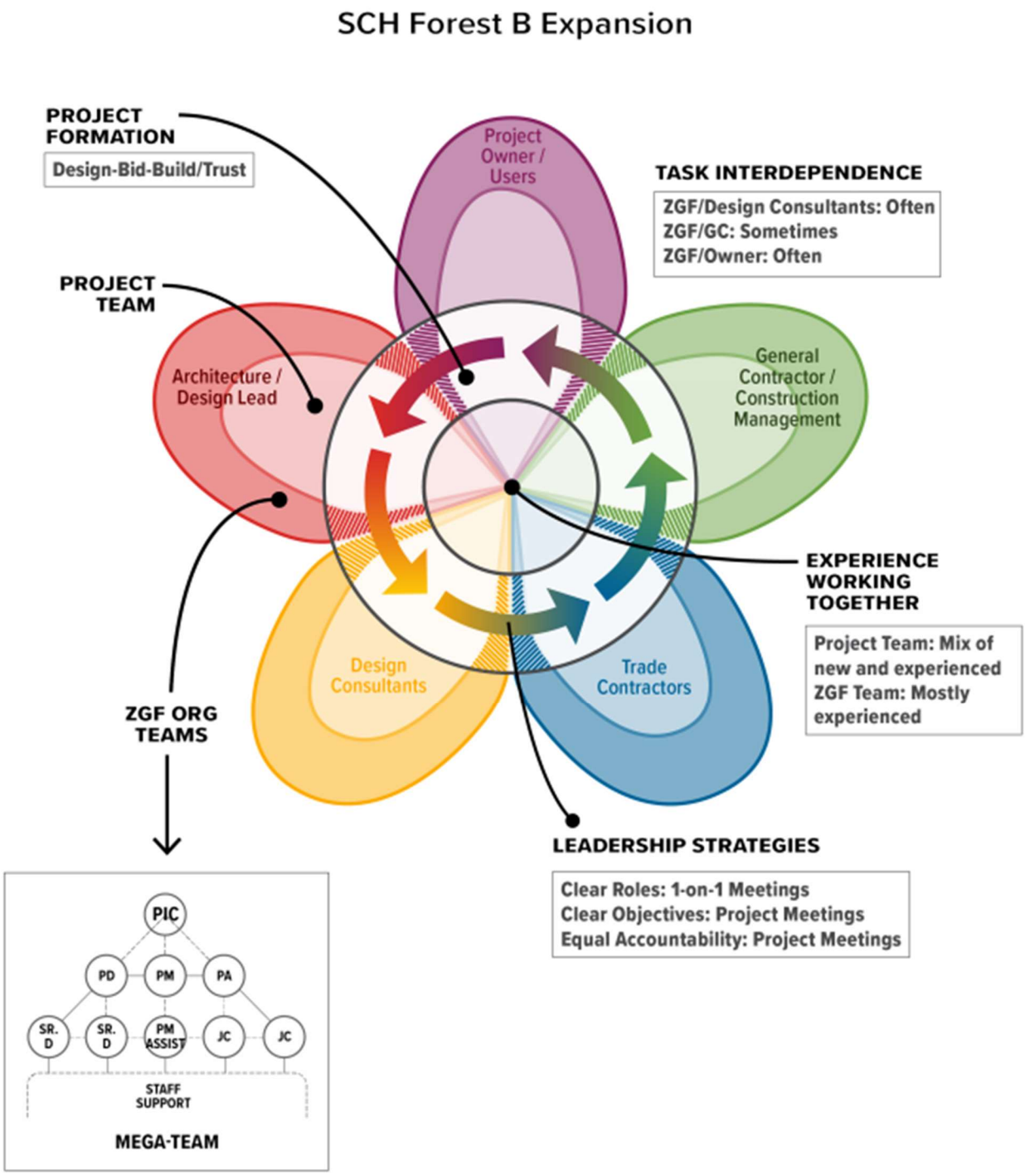

Figure 11 - Case Study #2 Recap

Case Study #3 - Team Formation Context and Graphic

Working Locations:

Working Location	Occupying Team(s)
Main Office	ZGF & DC (all of the time/often)
Project Office	GC & ZGF (all of the time & sometimes)
Remote	ZGF, DC & owner (rarely)

Team Experience:

Team Formation Context	CCH
ZGF Team Experience	Mostly experienced
Project Team Experience	New & Experienced
PIC Experience	Some experience with ZGF & PT, often choses ZGF roles
Project Start Timeline	Slightly later

Leadership Strategies

Leadership Strategy	Collaborating Group	CCH	
		ZGF Project Team Frequent Forum	PIC's Frequency of Use
Clear Roles	ZGF Team	Group Messages - All of the time	Often
	DC	1-on-1 - Often	All of the time
	Project Team	Project Meetings - Often	Sometimes
Clear Objectives	ZGF Team	Project Meetings - Often	Often
	DC	Project Meetings - Sometimes	Often
	Project Team	Project Meetings - Often	Often
Equal Accountability	ZGF Team	Project Meetings - Often	All of the time
	DC	Project Meetings - Often	All of the time
	Project Team	Project Meetings - Often	Often

CCH Team Formation Graphic

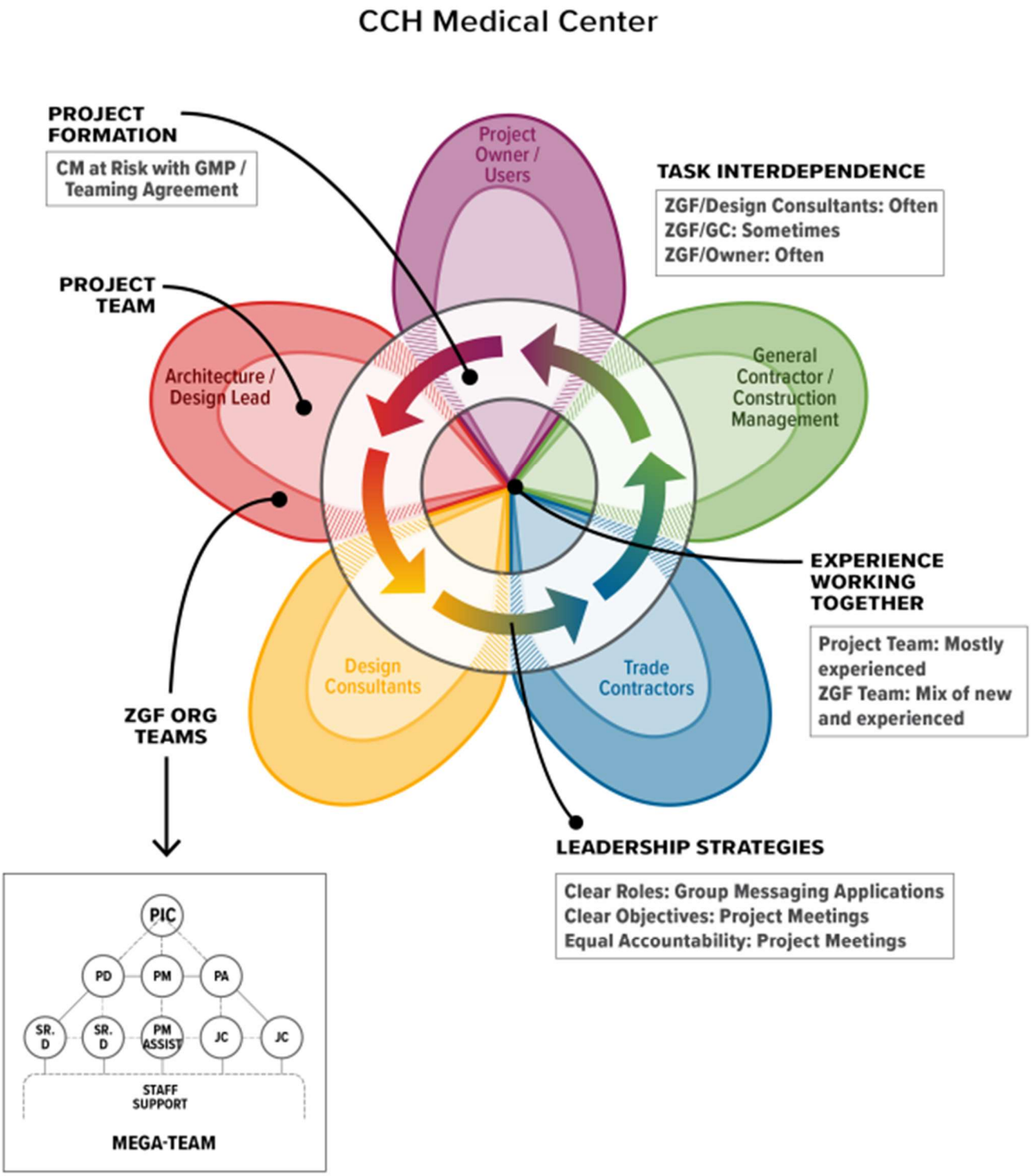

Figure 12 - Case Study #3 Recap

Recommendations

Working Locations

Recommendation: Explore how to share spaces with individuals and groups that have a high level of task interdependency. Emerging delivery models create new contracting relationships and needs to adjust where we work.

The individuals and groups with high task interdependency shared similar responses to work locations and if these two variables are related then finding opportunities to share work spaces could create more collaborative team outcomes. Observations in the ZGF main office of shared spaces between project teams and groups reflects this link with task interdependency identified in the surveys as well. While the internal teams appear to reflect this commonality of task interdependence, design consultants were also included as well. Having an onsite office may not be possible during design phases and the ability to share the main office spaces for work sessions with these external team partners is a valuable asset to have. There was also evidence to show a potential shift in task interdependence as design-build and multi-partner agreements create new partnerships that change how project teams are reliant on others' work. Finding spaces these emerging partnerships includes more time onsite and sharing spaces in main offices.

Digital Sharing

Recommendation: Appreciate the value in sharing across digital platforms.

Digital programs and group messaging platforms were often used by teams that had high task interdependence (ZGF and design consultants) on two separate case studies that were vastly different in project team size and scope. With the shift to more remote working currently being foisted upon the workforce due to the COVID-19 pandemic, the constraints of how we can work has now changed these platforms from optional to critical. While this research did not intend to answer the question of how to work remotely during a pandemic, there is an opportunity to explore how those teams are use those programs to find best practices and understand user value.

Project Meetings

Recommendation: Execute project meetings with purpose and focus on specific methods that lead to desired collaborative outcomes.

Project meetings were one of the most frequent forums used to communicate leadership strategies. Approach meeting facilitation with clear agendas, the right people and tracking tools coupled with the question of "how is this meeting serving our team and the project?"

Clear Objectives

Recommendation: Expand ZGF's culture of sharing by including more project individuals in team building exercises

While project meetings continue to be the most common forum for communicating project goals, objectives and vision, the value of team building exercises should not be ignored. Not only could these exercises also be included in project meetings to further propagate the objectives of the project, but the opportunity exists to create more cohesion with the project team.

Leadership Strategies

Recommendation: Trust your instincts and your teams. Every project is different and you will need to trust the individuals who are working directly with the situation to make the right decisions.

In the initial interviews, multiple PIC responses addressed the ability to use past experiences and trust instincts to understand how to lead their teams. This dynamic approach to leadership strategies was reflected in the various forums and frequencies that showed that individuals and teams appreciate the complexity of their situation to find ways to deliver their tasks. Various forums were found to have the highest frequency for similar categories and some teams bucked very traditional trends with the use of shared digital programs and group messaging programs. Developing teams to appreciate these situations could be enhanced by a diversity experience levels to allow for sharing of project experience, mentoring and even a possible new perspective on an old problem.

Equal Accountability and Culture of Learning

Recommendation: Leverage transparency and a focus on improvement to reinforce the value of equal accountability and culture of learning.

Project meetings were a common forum for tracking and verifying task progress within the ZGF project teams but tended to be less frequent with project teams as a whole. As past research has indicated, equal accountability is critical to developing mutual trust and respect (Team Matters reference) and there should be purpose in creating this culture with the entire project team. Teams cannot get better if they do not know where to improve and a project without a culture of equal accountability will limit team collaboration.

Future Research

Remote Teams, Technology and Collaboration

The COVID-19 pandemic put an urgency on organizations, project teams and individuals to work in more remote environments and has disrupted how people perform their tasks and responsibilities. Digital technology platforms, where teams share a variety of data including designs, planning tools and live conversations either as simple as text or as animated as video, allow for certain individuals and projects to continue working remotely. While having the ability to continue working during these unprecedented times appears to be an advantage on its face, understanding how the loss of in-person interactions needs to be explored. Technological solutions that maintain the flow of deliverables can be better developed if it is better understood where those team dynamics exist.

The Nature of Teams on Building Construction Projects

While the focus of this research was to understand how teams can form to create more collaborative outcomes, being able to see the boundaries of how teams are formed were critical to see where leadership strategies are applied. This not only applies to the project teams that identified through formal contracting methods but also informal teams that could as individuals align organizational and project missions. The potential of relationships that create a team dynamic are only limited by the imagination but these boundary conditions are critical to understand how processes work for different teams (Kozlowski & Bell, Work groups and teams in organizations, 2003).

Building Construction Projects with Trust

How is trust understood in teams? This research considered leadership strategies that were based on temporary groups that would represent the external partnerships with relation to the ZGF Project Team but the dynamics of trust that occur internally should be related to organizational studies. While research has documented how unique organizational relations creates a variety of phenomena regarding trust, the complexity offered with the arrangement of building projects and its multitude of actors and scenarios appears to offer a ripe opportunity for examination.

References

Cheng, R. (2015). *Integration at Its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector.* Sponsored by Ofce of Federal High-Performance Green Buildings, U.S. General Services Administraton.

Cheng, R. (2016). *Teams Matter: Lessons From ARRA.*

Fischer, M., Reed, D., Khanzode, A., & Ashcraft, H. (2014). A Simple Framework For Integrated Project Delivery. *22nd Annual Conference of the International Group for Lean Construction* , (pp. 1319-1330). Oslo, Norway.

Google. (2020, June 9). *re:Work*. From Google.com: https://rework.withgoogle.com/print/guides/5721312655835136/

Integrated Project Delivery: An Action Guide for Leaders. (2019, December 6). Monroe, IL, USA.

Kozlowski, S. W., & Bell, B. S. (2003). Work groups and teams in organizations. *Handbook of psychology (Vol. 12): Industrial and Organizational Psychology*, 333-375.

Kozlowski, S. W., & Bell, B. S. (2013). *Work Groups and Teams in Organizations: Review update.* From http://digitalcommons.ilr.cornell.edu/articles/927 : https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1938&context=articles

Kozlowski, S. W., & Ilgen, D. R. (2006). Enhancing the Effectiveness of Work Groups and Teams. *Association for Psychological Science*, 77-124.

Kramer, R. M., & Tyler, T. R. (1996). *Trust In Organizations.* Thousand Oaks: Sage Publications, Inc.

Leedy, P. D., Ormrod, J. E., & Johnson, L. R. (2019). *Practical Research: Planning and Design.* New York: Pearson.

Northhouse, P. G. (2019). *Leadership.* Thousand Oaks: SAGE Publications, Inc.

Thompson, T. (2020, January 24). Principal. (K. A. Hochstatter, Interviewer)

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods.* Thousand Oaks, California, USA: Sage Publications.

ZGF Architects. (2017, February). Red Book. ZGF Architects LLP.

Appendix of Figures and Tables

Figure 1 - Case Study #1 Executive Summary Recap 4
Figure 2 - Case Study #2 Executive Summary Recap 5
Figure 3 - Case Study #3 - Executive Summary Recap 6
Figure 4 - ZGF Team Structure 11
Figure 5 - Development of Case Study Categories from "Integration At Its Finest" 15
Figure 6 - Key Ingredient Relationship Map from "Teams Matter" 16
Figure 7 - Case Study #1 Project Delivery Formation 26
Figure 8 - Case Study #2 Project Delivery Formation 30
Figure 9 - Case Study #3 Project Delivery Formation 34
Figure 10 - Case Study #1 Recap 38
Figure 11 - Case Study #2 Recap 40
Figure 12 - Case Study #3 Recap 42

Table 1 - Case Study #1 Executive Summary Recap 4
Table 2 - Case Study #2 Executive Summary Recap 5
Table 3 - Case Study #3 Executive Summary Recap 6
Table 4 - Case Study #1 Project Context 25
Table 5 - Case Study #2 Project Context 29
Table 6 - Case Study #3 Project Context 33
Table 7 - Clear Roles & ZGF Project Team 48
Table 8 - Clear Roles & Design Consultants 49
Table 9 - Clear Roles & Project Team 50
Table 10 - Clear Objectives & ZGF Project Team 51
Table 11 - Clear Objectives & Design Consultants 52
Table 12 - Clear Objectives & Project Team 53
Table 13 - Equal Accountability - ZGF Project Team 54
Table 14 - Equal Accountability & Design Consultants 55
Table 15 - Equal Accountability & Project Teams 56
Table 16 - Working Locations 57
Table 17 - Task Interdependency 58

Table 7 - Clear Roles & ZGF Project Team

Clear Roles - The following heat maps show the responses from the **ZGF Project Team** and project leadership as they evaluate the frequency of use of the listed forums in order to scopes, roles and responsibilities withing their own team. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

Clear Roles

On this project, how often do you communicate scope, roles and responsibilities with the ZGF Project Team in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	0	1	0	1	0
	Often	0	1	2	0	1
	Sometimes	3	1	0	1	0
	Rarely	0	0	1	1	1
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Often	Rarely	Sometimes	Rarely	Sometimes

SCH

Clear Roles

On this project, how often do you communicate scope, roles and responsibilities with the ZGF Project Team in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	2	5	2	3	2
	Often	3	3	4	2	1
	Sometimes	2	0	1	3	3
	Rarely	2	1	2	1	3
	Never	0	0	0	0	0
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Sometimes	Sometimes	Rarely	Sometimes	Sometimes

CCH

Clear Roles

On this project, how often do you communicate scope, roles and responsibilities with the ZGF Project Team in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	1	1	1	5	1
	Often	6	7	5	2	3
	Sometimes	2	1	0	2	3
	Rarely	0	0	2	0	2
	Never	0	0	1	0	0
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	All of the time	Sometimes	Often	Often	Rarely

Table 8 - Clear Roles & Design Consultants

Clear Roles - The following heat maps show the responses from the ZGF Project Team and project leadership as they evaluate the frequency of use of the listed forums in order to scopes, roles and responsibilities with the **Design Consultants**. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

Clear Roles

On this project, how often do you communicate scope, roles and responsibilities with the Design Consultants in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	0	1	1	1	0
	Often	1	0	1	0	1
	Sometimes	2	2	0	0	0
	Rarely	0	0	1	1	1
	Never	0	0	0	1	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Often	Sometimes	Sometimes	Often	Often
Design Consultant	PIC	Often	Often	Sometimes	Often	Often
	PM	Sometimes	Often	Rarely	Never	Never
	PM	Sometimes	Often	Rarely	Often	Rarely

SCH

Clear Roles

On this project, how often do you communicate scope, roles and responsibilities with the Design Consultants in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	1	3	1	2	2
	Often	4	3	3	2	1
	Sometimes	3	1	4	2	3
	Rarely	1	2	1	3	1
	Never	0	0	0	0	2
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Sometimes	Sometimes	Rarely	Sometimes	Sometimes
Design Consultant	DC	Sometimes	Sometimes	Rarely	Never	Rarely
	DC	Often	Often	Rarely	Sometimes	Never
	DC	All of the time	All of the time	Sometimes	Rarely	Often

CCH

Clear Roles

On this project, how often do you communicate scope, roles and responsibilities with the Design Consultants in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	1	2	2	2	0
	Often	4	5	2	3	4
	Sometimes	2	2	2	2	2
	Rarely	2	0	1	2	2
	Never	0	0	2	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Sometimes	All of the time	Often	All of the time	Rarely
Design Consultant	DC	All of the time	Often	Sometimes	Sometimes	Rarely
	DC	Sometimes	All of the time	Often	Often	Sometimes
	DC	Often	Sometimes	Sometimes	Rarely	Rarely

Table 9 - Clear Roles & Project Team

Clear Roles - The following heat maps show the responses from the ZGF Project Team and project leadership as they evaluate the frequency of use of the listed forums in order to scopes, roles and responsibilities with the **Project Team (GC/CM & Owner/Users)**. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

		Clear Roles				
		On this project, how often do you communicate scope, roles and responsibilities with the entire Project Team in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	0	0	0	1	1
	Often	0	1	2	0	0
	Sometimes	3	1	0	1	0
	Rarely	0	0	1	1	1
	Never	0	1	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Often	Sometimes	Sometimes	Often	Often
Project Team	GC/CM	Often	Never	Rarely	Sometimes	Often
	GC/CM	Sometimes	Often	Never	Often	Sometimes
	GC/CM	Sometimes	Sometimes	Never	Sometimes	Never
	Owner's Rep	Sometimes	Sometimes	Sometimes	Sometimes	Rarely

SCH

		Clear Roles				
		On this project, how often do you communicate scope, roles and responsibilities with the entire Project Team in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	2	0	0	1	1
	Often	1	3	2	1	1
	Sometimes	4	3	4	3	1
	Rarely	1	3	3	4	5
	Never	1	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Sometimes	Sometimes	Rarely	Sometimes	Sometimes
Project Team	GC/CM	All of the time	Rarely	Sometimes	Rarely	Rarely
	GC/CM	Sometimes	Often	Rarely	Often	Often

CCH

		Clear Roles				
		On this project, how often do you communicate scope, roles and responsibilities with the entire Project Team in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards)?
ZGF Project Team	All of the time	1	0	0	1	0
	Often	5	3	4	2	3
	Sometimes	2	3	1	1	2
	Rarely	0	0	1	3	2
	Never	1	2	3	2	2
	Don't Know	0	1	0	0	0
ZGF Leader	PIC	Sometimes	All of the time	Sometimes	Often	Rarely
Project Team	GC/CM	Often	Often	Often	Sometimes	Rarely
	GC/CM	Often	Often	Rarely	Rarely	Rarely
	Owner/Users	Often	Often	Sometimes	Often	Sometimes

Table 10 - Clear Objectives & ZGF Project Team

Clear Objectives - The following heat maps show the responses from the **ZGF Project Team** and project leadership as they evaluate the frequency of use of the listed forums in order to communicate project goals, objectives and vision within their own team. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

		Clear Objectives					
		On this project, how often are project goals, objectives and vision communicated with the ZGF Project Team in the following forums?					
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	0	0	0	0	0	0
	Often	2	3	1	1	0	1
	Sometimes	1	0	1	0	1	0
	Rarely	0	0	1	2	2	2
	Never	0	0	0	0	0	0
	Don't Know	0	0	0	0	0	0
ZGF Leader	PIC	All of the time	Often	Often	Often	Sometimes	Sometimes

SCH

		Clear Objectives					
		On this project, how often are project goals, objectives and vision communicated with the ZGF Project Team in the following forums?					
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	2	1	1	2	2	2
	Often	6	5	3	4	2	1
	Sometimes	1	2	4	1	3	2
	Rarely	0	1	1	2	1	3
	Never	0	0	0	0	1	0
	Don't Know	0	0	0	0	0	1
ZGF Leader	PIC	Often	Rarely	Rarely	Rarely	Sometimes	Often

CCH

		Clear Objectives					
		On this project, how often are project goals, objectives and vision communicated with the ZGF Project Team in the following forums?					
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	1	1	0	1	1	1
	Often	6	3	4	3	3	3
	Sometimes	2	2	2	3	2	1
	Rarely	0	3	2	1	3	3
	Never	0	0	1	1	0	1
	Don't Know	0	0	0	0	0	0
ZGF Leader	PIC	Often	Often	Sometimes	Often	Rarely	All of the time

Table 11 - Clear Objectives & Design Consultants

Clear Objectives - The following heat maps show the responses from the ZGF Project Team and project leadership as they evaluate the frequency of use of the listed forums in order to communicate project goals, objectives and vision with the **Design Consultants**. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

Clear Objectives

On this project, how often are project goals, objectives and vision communicated with the Design Consultants in the following forums?

		Project Meetings?	Individual 1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task/team planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	0	0	0	0	0	0
	Often	2	2	1	1	1	0
	Sometimes	1	0	2	0	0	1
	Rarely	0	1	0	2	1	2
	Never	0	0	0	0	1	0
	Don't Know	0	0	0	0	0	0
ZGF Leader	PIC	All of the time	Often	Often	Sometimes	Often	Sometimes
Design Consultant	PIC	Often	Sometimes	Rarely	Rarely	Rarely	Rarely
	PM	Often	Sometimes	Rarely	Rarely	Sometimes	Rarely
	PM	Sometimes	Sometimes	Rarely	Rarely	Sometimes	Rarely

SCH

Clear Objectives

On this project, how often are project goals, objectives and vision communicated with the Design Consultants in the following forums?

		Project Meetings?	Individual 1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task/team planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	1	1	0	1	1	0
	Often	2	1	2	1	1	2
	Sometimes	4	5	4	3	5	3
	Rarely	0	1	2	3	1	2
	Never	0	0	0	0	0	2
	Don't Know	1	1	1	1	1	1
ZGF Leader	PIC	Often	Rarely	Rarely	Rarely	All of the time	Often
Design Consultant	DC	All of the time	Sometimes	Rarely	Sometimes	Rarely	Rarely
	DC	Often	Often	Rarely	Rarely	Sometimes	Sometimes
	DC	Often	Often	Rarely	Rarely	Often	Rarely

CCH

Clear Objectives

On this project, how often are project goals, objectives and vision communicated with the Design Consultants in the following forums?

		Project Meetings?	Individual 1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task/team planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	1	1	0	1	0	0
	Often	3	3	3	2	2	2
	Sometimes	5	2	3	3	3	1
	Rarely	0	2	2	3	3	2
	Never	0	0	1	0	1	4
	Don't Know	0	1	0	0	0	0
ZGF Leader	PIC	Often	Often	Rarely	Often	Sometimes	Often
Design Consultant	DC	All of the time	Often	Sometimes	Sometimes	Sometimes	Sometimes
	DC	Often	Often	Often	Often	Sometimes	Sometimes
	DC	Often	Rarely	Rarely	Rarely	Rarely	Never

Table 12 - Clear Objectives & Project Team

Clear Objectives - The following heat maps show the responses from the ZGF Project Team and project leadership as they evaluate the frequency of use of the listed forums in order to communicate project goals, objectives and vision with the **Project Teams (GC/CM & Owner/Users)**. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

		Clear Objectives					
		On this project, how often are project goals, objectives and vision communicated with the entire Project Team in the following forums?					
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	0	0	0	0	0	0
	Often	2	3	1	1	1	0
	Sometimes	1	0	1	0	0	1
	Rarely	0	0	1	2	2	2
	Never	0	0	0	0	0	0
	Don't Know	0	0	0	0	0	0
ZGF Leader	PIC	All of the time	Often	Often	Often	Often	Sometimes
Project Team	GC/CM	Often	Never	Rarely	Sometimes	Never	Often
	GC/CM	Often	Often	Never	All of the time	Sometimes	Often
	GC/CM	Sometimes	Sometimes	Never	Sometimes	Sometimes	Sometimes
	Owner's Rep	Often	Sometimes	Sometimes	Often	Rarely	Sometimes

SCH

		Clear Objectives					
		On this project, how often are project goals, objectives and vision communicated with the entire Project Team in the following forums?					
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	1	1	0	0	2	1
	Often	3	2	2	2	1	1
	Sometimes	5	5	5	3	5	2
	Rarely	0	0	2	3	1	2
	Never	0	0	0	1	0	2
	Don't Know	0	0	0	0	0	1
ZGF Leader	PIC	Sometimes	Sometimes	Rarely	Rarely	Often	Often
Project Team	GC/CM	Often	Rarely	Rarely	Sometimes	Rarely	Rarely
	GC/CM	Often	Often	Sometimes	Sometimes	Often	Sometimes

CCH

		Clear Objectives					
		On this project, how often are project goals, objectives and vision communicated with the entire Project Team in the following forums?					
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "hopes and dreams")?
ZGF Project Team	All of the time	0	0	0	0	0	0
	Often	5	1	1	2	3	1
	Sometimes	2	2	5	3	4	1
	Rarely	1	3	2	4	2	5
	Never	0	0	0	0	0	0
	Don't Know	1	3	1	0	0	1
ZGF Leader	PIC	Often	Often	Sometimes	Often	Sometimes	Often
Project Team	GC/CM	Often	Rarely	Sometimes	Sometimes	Never	Sometimes
	GC/CM	Rarely	Rarely	Rarely	Rarely	Rarely	Sometimes
	Owner/Users	Often	Often	Sometimes	Often	Sometimes	Sometimes

Table 13 - Equal Accountability - ZGF Project Team

Equal Accountability: The following heat maps show the responses from the **ZGF Project Team** and project leadership as they evaluate the frequency of use of the listed forums in order to communicate plans, priorities and verify task progress within their own team. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

Equal Accountability

On this project, how often do you communicate plans, priorities and verify task progress with the ZGF Project Team in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	0	1	0	1	0
	Often	1	1	2	1	1
	Sometimes	2	1	0	1	0
	Rarely	0	0	1	0	1
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	All of the time	Often	Often	Often	Often

SCH

Equal Accountability

On this project, how often do you communicate plans, priorities and verify task progress with the ZGF Project Team in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	3	1	1	3	2
	Often	3	5	4	2	1
	Sometimes	2	2	2	2	3
	Rarely	1	1	2	2	2
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Sometimes	Sometimes	Rarely	Rarely	Sometimes

CCH

Equal Accountability

On this project, how often do you communicate plans, priorities and verify task progress with the ZGF Project Team in the following forums?

		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	2	2	0	2	0
	Often	6	4	6	3	3
	Sometimes	1	2	2	1	3
	Rarely	0	1	2	3	2
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	All of the time	Sometimes	Rarely	Often	Rarely

Table 14 - Equal Accountability & Design Consultants

Equal Accountability: The following heat maps show the responses from the ZGF Project Team and project leadership as they evaluate the frequency of use of the listed forums in order to communicate plans, priorities and verify task progress with the **Design Consultants**. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

		Equal Accountability				
		On this project, how often do you communicate plans, priorities and verify task progress with the Design Consultants in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	0	0	0	1	1
	Often	1	2	1	0	0
	Sometimes	1	0	0	1	0
	Rarely	1	1	2	1	1
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	All of the time	Often	Often	Often	Often
Design Consultant	PIC	Often	Often	Rarely	Often	Often
	PM	Sometimes	Often	Rarely	Never	Never
	PM	Often	All of the time	Rarely	All of the time	Sometimes

SCH

		Equal Accountability				
		On this project, how often do you communicate plans, priorities and verify task progress with the Design Consultants in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	3	1	0	1	1
	Often	3	4	2	3	1
	Sometimes	1	2	5	2	2
	Rarely	2	2	2	3	4
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Sometimes	Sometimes	Rarely	Sometimes	Sometimes
Design Consultant	DC	Often	Sometimes	Rarely	Rarely	Rarely
	DC	Often	All of the time	Rarely	Sometimes	Often
	DC	Often	Sometimes	Rarely	Rarely	Rarely

CCH

		Equal Accountability				
		On this project, how often do you communicate plans, priorities and verify task progress with the Design Consultants in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	3	2	1	1	0
	Often	4	3	3	2	2
	Sometimes	2	2	3	3	5
	Rarely	1	2	2	3	0
	Never	0	0	0	0	2
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	All of the time	All of the time	Sometimes	Often	Rarely
Design Consultant	DC	All of the time	Often	Sometimes	Sometimes	Rarely
	DC	All of the time	All of the time	Often	Often	Sometimes
	DC	Often	Sometimes	Sometimes	Rarely	Rarely

Table 15 - Equal Accountability & Project Teams

Equal Accountability: The following heat maps show the responses from the ZGF Project Team and project leadership as they evaluate the frequency of use of the listed forums in order to communicate plans, priorities and verify task progress with the **Project Teams (GC/CM, Owner/Users)**. The colored ellipses represent the responses from the leadership per the results in the table given.

WSU

		Equal Accountability				
		On this project, how often do you communicate plans, priorities and verify task progress with the entire Project Team in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards/...)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	0	0	0	1	1
	Often	1	2	1	0	0
	Sometimes	1	0	0	1	0
	Rarely	1	1	3	1	1
	Never	0	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	All of the time	Often	Often	Often	Often
Project Team	GC/CM	Often	Never	Rarely	Sometimes	Never
	GC/CM	All of the time	All of the time	Rarely	All of the time	Often
	GC/CM	Sometimes	Sometimes	Never	Sometimes	Never
	Owner's Rep	Often	Sometimes	Often	Often	Rarely

SCH

		Equal Accountability				
		On this project, how often do you communicate plans, priorities and verify task progress with the entire Project Team in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards/...)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	1	0	0	0	1
	Often	2	4	1	3	1
	Sometimes	3	2	4	1	1
	Rarely	2	3	4	5	5
	Never	1	0	0	0	1
	Don't Know	0	0	0	0	0
ZGF Leader	PIC	Often	Sometimes	Sometimes	Often	Often
Project Team	GC/CM	All of the time	Sometimes	Sometimes	Sometimes	Rarely
	GC/CM	Sometimes	Often	Sometimes	Sometimes	Sometimes

CCH

		Equal Accountability				
		On this project, how often do you communicate plans, priorities and verify task progress with the entire Project Team in the following forums?				
		Project Meetings?	Individual/1-on-1 Meetings (personal conversations, digitally documented conversations, phone calls)?	Shared digital programs (design/spreadsheets/task planners/dashboards/...)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, tracking logs)?
ZGF Project Team	All of the time	2	0	0	0	0
	Often	3	2	3	1	1
	Sometimes	2	2	1	2	4
	Rarely	0	2	2	3	0
	Never	2	2	3	3	4
	Don't Know	0	1	0	0	0
ZGF Leader	PIC	Often	All of the time	Sometimes	All of the time	Rarely
Project Team	GC/CM	Often	All of the time	Often	Sometimes	Rarely
	GC/CM	Often	Often	Rarely	Rarely	Rarely
	Owner/Users	Often	Often	Sometimes	Often	Sometimes

Table 16 - Working Locations

WSU

Working Locations		On this project, how much time do you spend in working in the following locations?			On typical/similar projects, how much time do you spend in working in the following locations?		
		Your Organization's Main Office	Onsite Project Office	Remotely (not in either your main office or project office)	Your Organization's Main Office	Onsite Project Office	Remotely (not in either your main office or project office)
ZGF Project Team	80%-100%	2	0	0	1	0	0
	60%-80%	1	0	0	1	0	0
	40%-60%	0	0	0	1	0	0
	20%-40%	0	0	1	0	1	1
	0-20%	0	0	1	0	1	1
	Never	0	3	1	0	1	1
ZGF Leader	PIC/PM	20%-40%	Never	0-20%	20%-40%	Never	0-20%
Project Team	GC	80%-100%	Never	Never	80%-100%	Never	Never
	GC	60%-80%	0-20%	Never	60%-80%	20%-40%	Never
	GC	60%-80%	Never	20%-40%	60%-80%	Never	20%-40%
	Owner/Users	80%-100%	Never	Never	80%-100%	Never	Never
Design Consultants	DC	80%-100%	Never	Never	80%-100%	Never	Never
	DC	80%-100%	0-20%	Never	80%-100%	0-20%	Never
	DC	80%-100%	Never	0-20%	80%-100%	Never	0-20%

SCH

Working Locations		On this project, how much time do you spend in working in the following locations?			On typical/similar projects, how much time do you spend in working in the following locations?		
		Your Organization's Main Office	Onsite Project Office	Remotely (not in either your main office or project office)	Your Organization's Main Office	Onsite Project Office	Remotely (not in either your main office or project office)
ZGF Project Team	80%-100%	4	0	0	5	0	0
	60%-80%	2	0	0	3	0	0
	40%-60%	1	0	1	1	0	1
	20%-40%	0	2	0	0	3	0
	0-20%	0	4	4	0	5	3
	Never	0	1	4	0	1	5
ZGF Leader	PIC/PM	60%-80%	20%-40%	0-20%	60%-80%	0-20%	0-20%
Project Team	GC	0-20%	80%-100%	Never	Never	80%-100%	Never
	GC	0-20%	80%-100%	Never	Never	80%-100%	Never
Design Consultants	DC	80%-100%	Never	0-20%	80%-100%	Never	0-20%
	DC	40%-60%	Never	20%-40%	40%-60%	Never	20%-40%
	DC	80%-100%	Never	0-20%	80%-100%	Never	Never

CCH

Working Locations		On this project, how much time do you spend in working in the following locations?			On typical/similar projects, how much time do you spend in working in the following locations?		
		Your Organization's Main Office	Onsite Project Office	Remotely (not in either your main office or project office)	Your Organization's Main Office	Onsite Project Office	Remotely (not in either your main office or project office)
ZGF Project Team	80%-100%	1	1	0	5	0	0
	60%-80%	3	0	0	0	1	0
	40%-60%	3	1	0	3	1	0
	20%-40%	0	1	1	0	1	1
	0-20%	0	2	3	1	2	2
	Never	1	4	5	0	4	6
ZGF Leader	PIC/PM	60%-80%	0-20%	0-20%	60%-80%	0-20%	0-20%
Project Team	GC/CM	Never	80%-100%	Never	0-20%	60%-80%	0-20%
	GC/CM	0-20%	60%-80%	Never	0-20%	60%-80%	Never
	Owner/Users	20%-40%	20%-40%	20%-40%	20%-40%	20%-40%	20%-40%
Design Consultants	DC	80%-100%	Never	0-20%	80%-100%	Never	0-20%
	DC	60%-80%	20%-40%	0-20%	80%-100%	0-20%	Never
	DC	80%-100%	Never	Never	80%-100%	Never	Never

Table 17 - Task Interdependency

WSU

Task Interdependency

		On this project, How often are you working on INTERDEPENDENT project tasks with the following groups/teams?					On similar/typical projects, How much do you spend working on INTERDEPENDENT project tasks with the following groups/teams?				
		ZGF Project Team	Design Consultants	GC/CM	Owner/Users	Project Team (as a whole)	ZGF Project Team	Design Consultants	GC/CM	Owner/Users	Project Team (as a whole)
ZGF Project Team	All of the time	2	0	0	0	0	2	1	0	1	1
	Often	1	2	1	2	2	1	2	3	2	2
	Sometimes	0	1	1	0	1	0	0	0	0	0
	Rarely	0	0	1	1	0	0	0	0	0	0
	Never	0	0	0	0	0	0	0	0	0	0
ZGF Leader	PIC/PM	Often	Often	Often	Often	Often	Often	Often	Often	Often	Often
Project Team	GC	Rarely	Often	Often	Sometimes	Sometimes	Never	Often	Often	Sometimes	Sometimes
	GC	Often	Often	All of the time	Sometimes	Sometimes	Sometimes	Sometimes	All of the time	Sometimes	Sometimes
	GC	Sometimes	Rarely	Often	Sometimes	Sometimes	Sometimes	Rarely	Often	Sometimes	Sometimes
	Owner/Users	Often	Often	Often	Often	Often	Often	Often	Often	Often	Often
Design Consultants	DC	Often	Often	Often	Sometimes	Sometimes	Often	Often	Often	Sometimes	Rarely
	DC	Sometimes	Sometimes	Rarely	Rarely	Sometimes	Sometimes	Sometimes	Rarely	Rarely	Sometimes
	DC	All of the time	Sometimes	Often	Rarely	Sometimes	All of the time	Sometimes	Sometimes	Rarely	Sometimes

SCH

Task Interdependency

		On this project, How often are you working on INTERDEPENDENT project tasks with the following groups/teams?					On similar/typical projects, How much do you spend working on INTERDEPENDENT project tasks with the following groups/teams?				
		ZGF Project Team	Design Consultants	GC/CM	Owner/Users	Project Team (as a whole)	ZGF Project Team	Design Consultants	GC/CM	Owner/Users	Project Team (as a whole)
ZGF Project Team	All of the time	6	1	0	1	3	6	0	1	1	3
	Often	1	6	3	4	4	1	1	2	5	5
	Sometimes	2	2	5	2	1	1	1	4	2	0
	Rarely	0	0	1	0	1	1	1	2	1	1
	Never	0	0	0	2	0	0	0	0	0	0
ZGF Leader	PIC/PM	Often	Often	Sometimes	Sometimes	Often	Often	Often	Sometimes	Sometimes	Often
Project Team	GC/CM	Sometimes	Rarely	All of the time	Often	All of the time	Often	Often	All of the time	Often	All of the time
	GC/CM	Often	Often	All of the time	All of the time	All of the time	Often	Often	All of the time	All of the time	All of the time
Design Consultant	DC	Often	Often	Sometimes	Sometimes	Often	Often	Often	Sometimes	Sometimes	Often
	DC	All of the time	All of the time	All of the time	All of the time	All of the time	All of the time	All of the time	All of the time	All of the time	All of the time
	DC	Often	Sometimes	Sometimes	Rarely	Often	Sometimes	Rarely	Rarely	Rarely	Rarely

CCH

Task Interdependency

		On this project, How often are you working on INTERDEPENDENT project tasks with the following groups/teams?					On similar/typical projects, How much do you spend working on INTERDEPENDENT project tasks with the following groups/teams?				
		ZGF Project Team	Design Consultants	GC/CM	Owner/Users	Project Team (as a whole)	ZGF Project Team	Design Consultants	GC/CM	Owner/Users	Project Team (as a whole)
ZGF Project Team	All of the time	7	3	0	1	0	7	3	0	1	0
	Often	2	4	2	6	4	1	4	2	6	6
	Sometimes	0	2	6	0	3	0	2	6	1	2
	Rarely	0	0	3	2	1	0	0	3	1	1
	Never	0	0	0	0	1	1	0	0	0	0
ZGF Leader	PIC/PM	All of the time	All of the time	All of the time	All of the time	All of the time	All of the time	Sometimes	Sometimes	Often	Often
Project Team	GC/CM	Often	Often	All of the time	Often	Often	Never	Often	All of the time	Often	Sometimes
	GC/CM	Sometimes	Sometimes	Never	Often	Often	Sometimes	Sometimes	Never	Often	Often
	Owner/Users	Often	Often	Often	Often	Often	Often	Often	Often	Often	Often
Design Consultant	DC	Often	Sometimes	Sometimes	Rarely	Often	Often	Sometimes	Sometimes	Rarely	Sometimes
	DC	All of the time	All of the time	Often	Often	All of the time	Never	All of the time	Often	Often	All of the time
	DC	Often	Often	Sometimes	Often	Often	Never	All of the time	All of the time	All of the time	All of the time