

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

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Foreword

Our best projects are always a result of a deep and rich collaboration with our clients, our larger design team of design consultants, the general contractor, and the trade contractors. Achieving this deep and rich level of collaboration requires a dedicated and concerted effort by all project team members, and can be, more often than we would like, frustratingly elusive to achieve. Admittedly, achieving an optimal level of collaboration can even be challenging to achieve at times within our internal ZGF teams. Recognizing that every project has its own unique circumstances and that every project team has its own unique personality, we are constantly assessing how to optimize the collaborative environment that our project teams are engaging in. From this perspective, we are pleased to have been able to sponsor the *Designing for Collaboration* research by Kirk Hochstatter presented in this document to better understand the factors and influences that have impacted the performance of three of our project teams. Kirk started his research in the Fall of 2019, but had to complete his research in the first half of 2020 when we were all forced to work remotely due to the COVID-19 pandemic. Undoubtedly, the pandemic has only served to reinforce how critical and fragile the interpersonal ties that are needed for optimal team performance can be, and it has pushed us all to re-think how best to collaborate virtually in order to deliver successful project outcomes.

We first had the opportunity to work with Renée Cheng when she led a case study of our Federal Center South project as part of her 2015 *Integration at its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector* research initiative when she was at the University of Minnesota. When she was appointed Dean at the University of Washington College of Built Environments (UW CBE) and invited us to be a founding member of the UW CBE Applied Research Consortium (ARC), we enthusiastically said “yes”. Renée’s prior research on successful integrated collaborative teams has served as a great resource to inform and build upon in Kirk’s research presented in the following pages.

Our participation in the UW Applied Research Consortium offers the opportunity to dive deeper into issues that are meaningful for our clients and that offer the opportunity to advance the larger design and construction industry. Our hope is that *Designing for Collaboration* can be a resource that both design and construction teams can utilize to optimize their ability to deliver the highest quality projects for all of our clients. We would welcome the opportunity to further advance the dialogue around high-performing teams, and therefore, look forward to your questions and comments.

ZGF ARCHITECTS



Todd Stine AIA, DBIA, LEED AP BD+C
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Acknowledgments

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.

This research was possible thanks to the partnership with the University of Washington's College of Built Environment, ZGF Architects, and all the professional organizations that support research in higher education.

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 Renée Cheng for developing and leading this Applied Research Consortium and making time to help guide me on these topics. Enough cannot be said for Jennifer Davidson and all the individuals who have supported our cohort of fellows and worked tirelessly to develop this research community. All the respect and appreciation to the faculty in the Construction Management department including 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.

Executive Summary

Designing for Collaboration focuses on project teams within a single architectural firm and examines how they work on complex, collaborative project delivery methods. By understanding the different scales of the organization (firm), internal project team (inside the firm), and external project members (outside the firm), this research 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.

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

The Recommendations are intended to provide useful information to others on how collaborative design and construction teams can continue to implement effective project leadership.



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 / construction manager. With the rise of 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 these factors 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 an architecture and interior design firm based in the Pacific Northwest, with offices in Seattle, Los Angeles, New York, Portland, Denver, Vancouver, BC, 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.

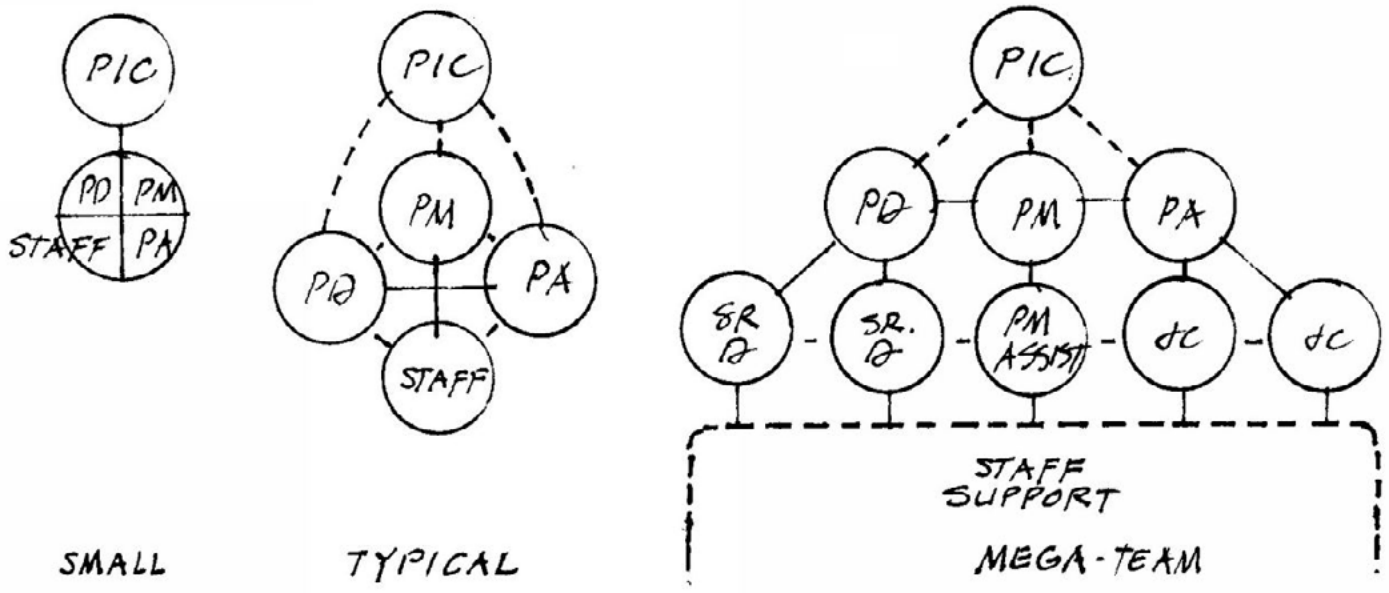


Figure 1 - ZGF Team Structure (ZGF Architects, 2017)

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.

Literature Review

WORK GROUPS AND TEAMS

Establishing basic definitions of work groups and teams and understanding how factors like task interdependence, team composition, formation, and leadership are all critical in assessing how effective collaboration can be achieved. 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. The knowledge developed by previous research will sculpt the framework for how the case studies are examined.

With further investigation into 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 and 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 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, 2013)**. The nature of these work teams and groups needs to meet

simple criteria such as having two or more individuals who 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, 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 externally driven, roles are based on specialized knowledge and skill, and on-going coordination of individual and team performance is required to be done in real time, to name a few **(Kozlowski & Bell, 2013)**. With a dynamic task environment that involves external and internal coupling while maintaining workflow interdependence, these features identify key contributors 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 a factor as research has shown it contingent on tasks and the team environment that they operate in and can 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 developing a program that welcomes the newcomer into their role can improve their fit, and resulting outcome 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, and 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

Research on 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**). The following research on ZGF's teams will parse this 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 applies to both their interactions with 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. Given 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 continue 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 directly 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 high-performance building projects that ZGF designs 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, 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.

The reports provide detailed development of case studies with their applicable theories and analysis to show the possible links between key ingredients and outcomes. The case study categories of 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, where discourse generates shared stories that help persuade individuals and organizations in working towards a shared goal. 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.

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. 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**). Many of these strategies for collaborative outcomes were identified as part of the case studies of the previous reports.

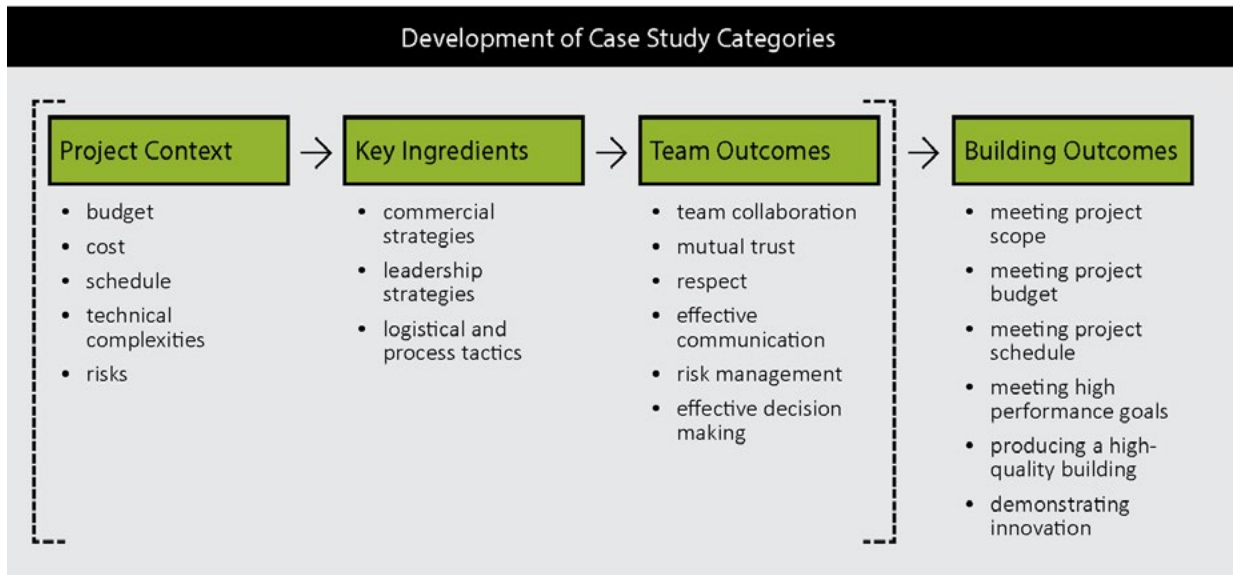


Figure 2 - Development of Case Study Categories from “Integration At Its Finest” (Cheng, Integration at Its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector, 2015)

KEY INGREDIENT RELATIONSHIP MAP

KEY INGREDIENTS

TEAM OUTCOME

LOGISTICAL & PROCESS TACTICS

LEADERSHIP STRATEGIES

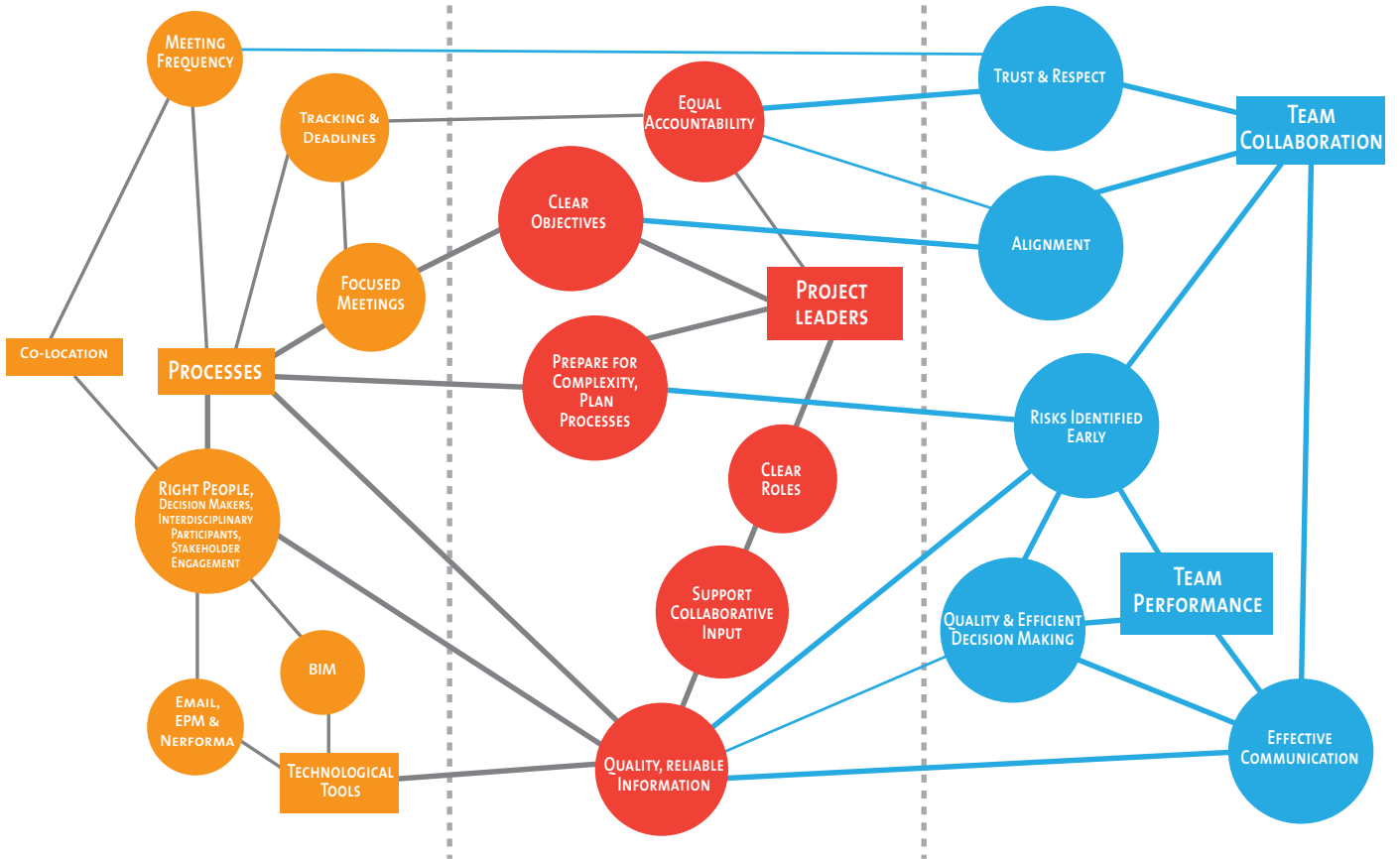


Figure 3 - Key Ingredient Relationship Map from "Teams Matter" (Cheng, Teams Matter: Lessons From ARRA, 2016)



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 acknowledgment 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 examining the characteristics and context of the teams that have been formed, a better understanding can be made with respect to how they work together. By focusing on the position of leadership in these teams, we can isolate a potential factor in understanding potential strategies to lead to collaborative outcomes, including specific examples outlined in reports addressing industry and project specific examples. It is in these examples that we find leadership strategies that this research can start to focus on, including clear roles, clear objectives, and equal accountability. It is within this understanding that the following case studies dive further into the specific leadership strategies and project context to better understand how the ZGF organization is utilizing leadership and developing its project teams to create more collaborative outcomes.

Methodology

Leadership strategies and collaborative outcomes can be considered a complex social phenomena, and in the real-world context where the boundaries are not clearly evident, a case study approach is an acceptable method for examination. With the focus of this research on leadership strategies and collaborative outcome, there is a need to understand a 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 work as a boundary for a case study and the past research that has been done that also adopts this approach. Each project examined can be compared against similar projects in order to appreciate 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 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. These surveys were distributed to both the internal and external project team members. The survey responses were categorized by project, organization, team, and individual and then 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 as well as for future 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 managers. 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 main office located in downtown Seattle, which offered the opportunities for in-person observations of individuals, teams and their working spaces. The ZGF Seattle office space occupies two floors of a modern commercial high-rise building and offers a plethora of resources including access to 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 efforts, 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. Several interviews were conducted to collect both project specific information and more general information about project work flow.

Six individuals who were either 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 each 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 were then be used to develop a survey for the ZGF team and project leaders and determine the case studies that would be examined.

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 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 acknowledgment 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 the use of technology to share ideas including 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 required to be implemented 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.

Survey Development

The survey developed was based on previous research addressing team formation, leadership strategies and collaborative outcomes, as well as observational studies and the PM/PIC interview responses. The survey consisted 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 were assigned a sequence of questions designed to take less than 15 minutes to complete, with clear and straightforward queries that did not give clues for any preferred responses. The multiple choice platform allowed for the ability to compare the group and individual responses. The survey was uploaded to Catalyst for pilot testing with participants not

associated with the case studies. The pilot test participants represented both industry and non-industry in order to determine relevance, timing, and clarity with the questions presented. Multiple rounds of pilot testing were completed. 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 to allow for distribution to multiple projects while identifying the individuals, teams and leaders that will be compared in each case study. The primary focus was on the ZGF PM/PIC and their project team consisting of individuals that are tasked with developing, distributing, coordinating and administering the design scope for the building project. Other project teams that were 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 with participation limited to the leadership representing their group. These categories assisted in the identification of individuals and groups how their leadership strategies influenced collaborative team outcomes.

Survey participants were required to respond to questions that assessed their experience of working on similar projects and the individuals on the project. Individuals who were more familiar working with each other may not have required the same approaches to socialization required for team formation and even suggested 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 were 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 affected by multiple factors including technical support and access to resources and the survey quantified the percentage of time an individual worked on the project, both in their main office and remotely. The project timeline impacted the ability to work in onsite offices and participants were 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 were implemented. The participants were asked 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 was compared with leadership responses to possibly understand how the various strategies being implemented by the ZGF PM/PIC aligned with how other team members were perceiving it. Additionally, responses suggested a popular forum could provide a focus on where to improve facilitation of collaborative outcomes based on the leadership strategy it applies too.

With a strong focus on the individual leaders of these project teams, PM/PIC's were asked additional questions focused on experience with the organization and the design industry overall, as

well as project specific inquiries into team formation and sharing of budgets and schedules. These questions were intended to examine potential influences in team development, including timeline and team selection. With the observed culture of sharing in the ZGF Seattle office, questions regarding sharing with project partners was posed to examine its prevalence beyond their own team. The responses provide context to any influences of individual leadership strategies within each case study.

The findings from these surveys informed the recommendations for leadership strategies that support collaborative outcomes. ZGF project team responses were translated into 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 were based on the unique conditions of the ZGF organization but with the intent to be viable for various organization seeking strategies for more collaborative team outcomes.

Survey Distribution

The survey was distributed to the three case studies selected and the participants included ZGF project team members 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 it could be completed online with results collected within a single database. Over three weeks, 42 responses were collected that included 24 ZGF employees, 7 individuals who represent GC/CM's, 9 from design consultants, and 2 owner's reps.

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 was

utilized to create 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



Program
WSU TRI-CITIES ACADEMIC BUILDING - PHASE 1 PROGRAM

STUDENT ROTUNDS ROOM
FACULTY RESOURCE SPACE

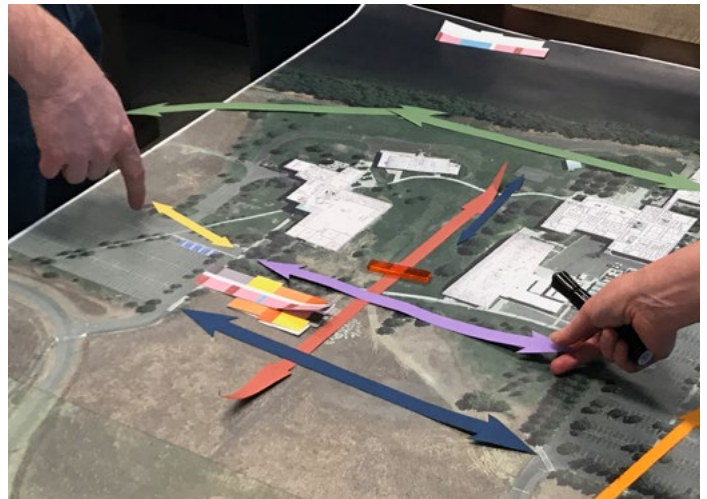
BIO **BIO** **CHEM** **CHEM** **PHYS** **PHYS** **ANAT**

ACTIVE LEARN. CLASSROOM **96** **32**

SEM/STUDY SOLUTION ROOMS

FACULTY HOTELLING

Name	SF	QTY	Sub Total	Sub Total NSF	14,230
1.0 Public					
1.1 Entry/Gathering	1,200	1	1,200	47%	14,230
Public Total			1,200		61,474
2.0 Instructional Lab					
2.1 Physics	1,854	1	1,854		
2.2 Biology	1,854	2	3,708		
2.3 Chemistry	1,854	1	1,854		
2.4 Anatomy/Physiology	1,854	1	1,854		
2.5 Geology	1,854	1	1,854		
Instructional Lab Total			11,278		
3.0 Lab Support					
3.1 General Lab Support	221	7	2,217		
3.2 Substitution Classroom	331	1	331		
3.3 Environmental Science	331	1	331		
3.4 Materials Class	48	2	96		
3.5 High Density equipment	221	1	221		
3.6 High Density equipment	221	1	221		
Lab Support Total			4,127		
5.0 Building Support					
5.1 Staircase - South	330	1	330		
5.2 Control Closet	80	2	160		
5.3 Maintenance Room	110	1	110		
5.4 Lab Control Room	200	1	200		
5.5 Control Room (CP)	110	1	110		
5.6 Net (Load)	220	1	220		
5.7 Mail/Storage Room	110	1	110		
5.8 Mechanical Room	400	1	400		
5.9 Mechanical Room	100	2	200		
5.10 Mail Load	400	2	800		
5.11 Postoffice - Unknt	100	2	200		
5.12 Postoffice - Unknt	400	2	800		



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 2019
Project Completion Date	May 2021
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 1 - Case Study #1 Project Context

Project Delivery Method/Contract

Formation: The general contractor and architect joined as a design-build team to pursue and win the WSU Tri-Cities Academic Building “progressive design-build” project. The DBIA contract with WSU included obligations from preconstruction through occupancy of the building and design-build arrangements including 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 would be driven by the WSU contract. The agreement also clarified reimbursement of the fees during the programmatic and design development period.

Working Locations Takeaways:

With majority of activities during the preconstruction phases, the ability to work at an onsite office is a highly unlikely. This does not preclude exploration of co-location on other projects that have a high degree 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 of the GC working with the ZGF project team is apparent and suggests that the team formation strategies, like the design-build contract, has created a higher rate of task interdependence.

Clear Role Takeaways: 1-on-1 meetings appear to be the most frequent way that

WSU Tri-Cities: Design-Build

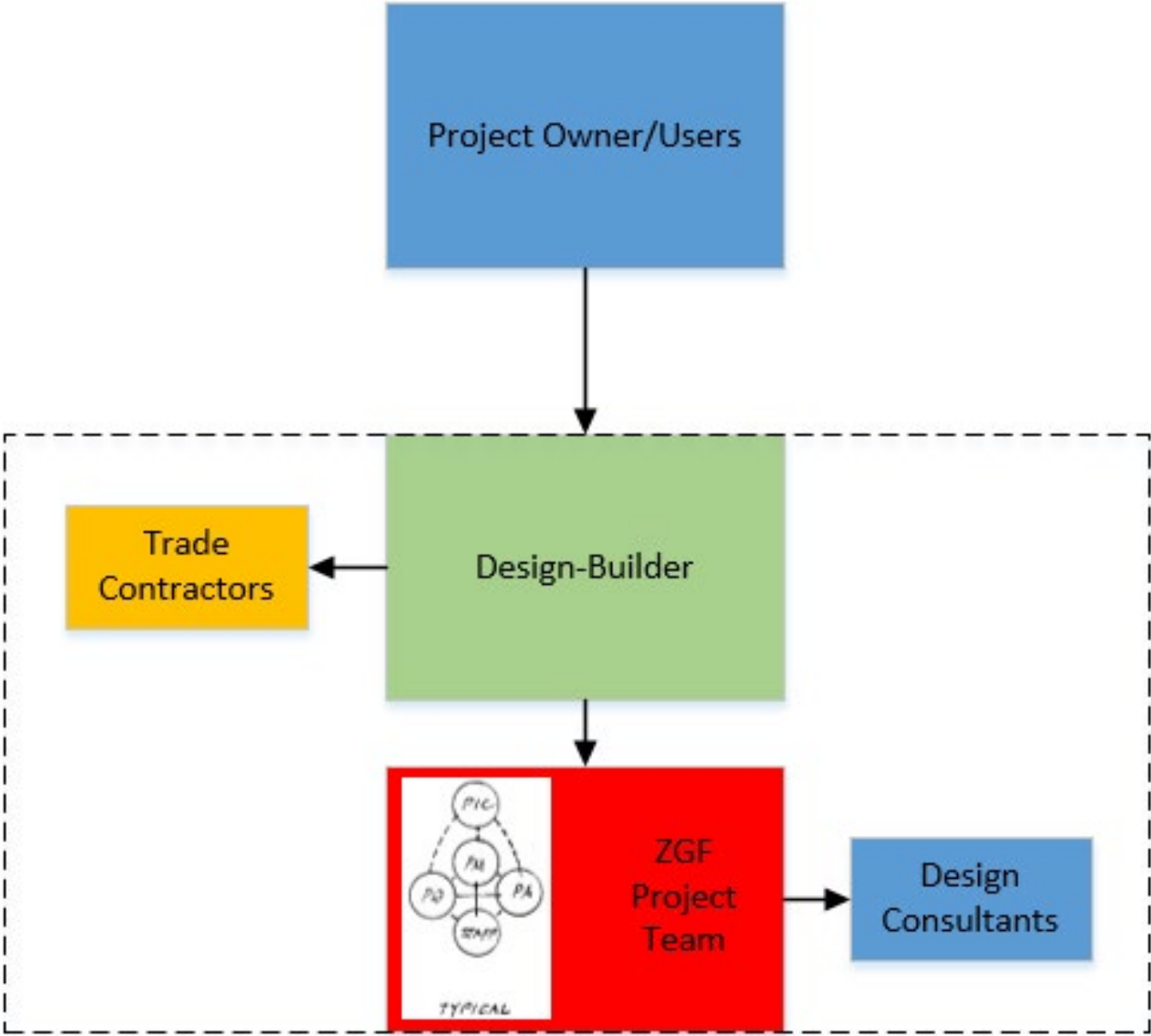


Figure 4 - Case Study #1 Project Delivery Formation



the ZGF project team communicates 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 Principal-in-Charge had strong agreement with the frequency of using 1-on-1 meetings “often” to discuss project goals and objectives. The responses from leadership from all teams, including the Principal-in-Charge, indicated that project meetings were the most frequent forum for communication.

Equal Accountability Takeaways: The overall responses indicate that teams

prefer 1-on-1 meetings for driving equal accountability, with stronger evidence suggesting that this is the preferred method between the PIC and Design Consultant leadership. Still, there is alignment suggesting that team meetings are the preferred forum for ZGF project team leaders.

Project Team Experience Takeaways: ZGF, the design consultants, and the owner/users had the most familiarity with working together previously and the responses from the general contractors suggest they have work experience with team members not surveyed.



Project Start Takeaways: The ZGF project team responses are mixed on when they started on this project versus past experience, but the Principal-in-Charge and Design Consultants did indicate they started earlier.

ZGF Principal-in-Charge Takeaways: Abilities and experience are a high value for assigning project roles, and sharing of information is an often occurrence with the project teams.

SURVEY TAKEAWAYS: With the project team being surveyed in the preconstruction phase, the interactions and task interdependency is as expected to be heavy between the ZGF project team and design disciplines. The use of 1-on-1 meetings and project meetings were the more common forum for leadership strategies with these teams and the responses suggest some form of working experience or familiarity throughout the project organizations.

Case Study #2: Seattle Children's 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 2017
Project Completion Date	July 2021
# of ZGF Design Consultants	21
Project Owner/User	Seattle Children's Hospital
Project CM/GC/Trade Contractors	Sellen Construction

Table 2 - Case Study #2 Project Context

Project Delivery Method/Contract

Formation: ZGF and the general contractor signed separate agreements with the project owner, and a development manager assisted 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. The Principal-in-Charge 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 design and pull planning activities. The design development with the hospital users was done using these lean principles, and several of the planning sessions were documented in the project files.

Working Locations Takeaways:

The responses from the design disciplines indicate that their main office is the more frequent work location and the leaders from the GC were more frequently onsite. Both ZGF and GC responses suggest that their time onsite is an increase from past projects.

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, with a leader from the GC noting this as well.

Clear Role Takeaways: The use of 1-on-1 meetings and project meetings are the most frequent forums for design disciplines. Responses were scattered for other forums.

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

SCH Forest B Expansion: Design-Bid-Build

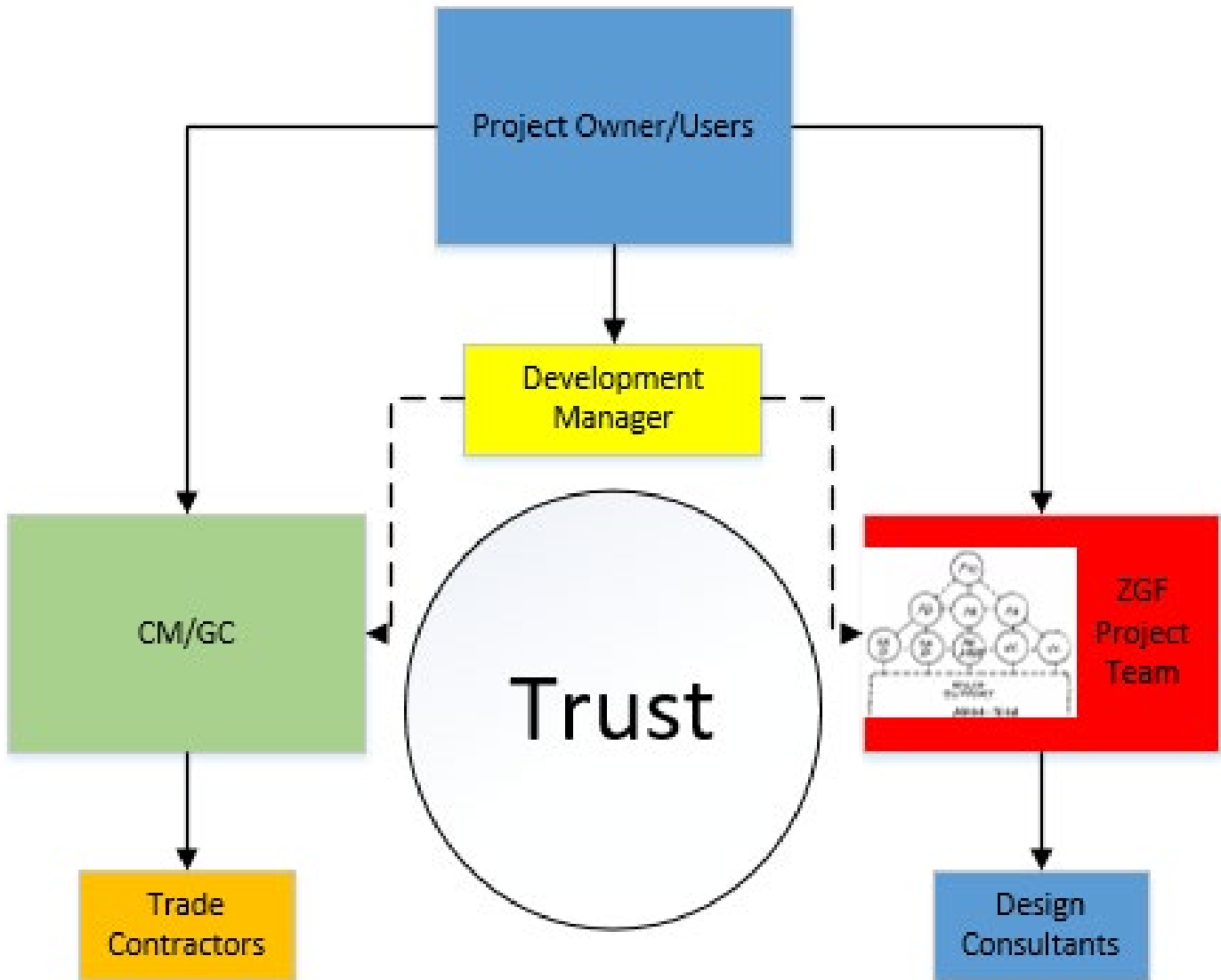


Figure 5 - Case Study #2 Project Delivery Formation

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 design

consultants. 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 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 have worked with less than 1-2 people within this ZGF project team. This trend of mixed experience also was apparent with those who have worked with the Principal-in-Charge 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 Principal-in-Charge and the Design Consultant leadership. One of the responses from the GC relayed an earlier start for that individual.

ZGF Principal-in-Charge Takeaways:

The Principal-in-Charge puts high value skills and experience for determining roles. 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 TAKEAWAYS: The project teams work locations appear to be divided between design and construction tasks. The ZGF project team and design consultants have a high frequency of working in their main offices while the GC is at the onsite project office. Task interdependency appears to be most frequent amongst the design disciplines and increased during the 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. Several individuals across all teams had years of experience working for their companies and working together, while others were not as experienced or familiar with one another. 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: Cincinnati Children's Hospital Medical Center



PROJECT CONTEXT

Case Study Context	CCH Medical Center
Project Location	Cincinnati, OH
Project Value (\$)	\$565,000,000.00
Project Type	Healthcare
Project Start Date for ZGF	May 2016
Project Completion Date	July 2021
Current Stage of Project	Construction Administration
# Design Consultants	17
Project Owner/User	Cincinnati Children's Hospital
Project GC/CM	Messier Construction

Table 3 - Case Study #3 Project Context

Project Delivery Method/Contract

Formation: The contract prior to the current project, the client had previously used design/build as their preferred contracting method. For this project, CCHMC met with ZGF, the associate architect contracted through ZGF, and the general contractor and decided the most preferred contract 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. It also included 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 with 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. The agreement included sharing digital designs within a BIM model with program requirements and processes for quality control and documentation.

Cincinnati Children's Hospital: CM at Risk with GMP

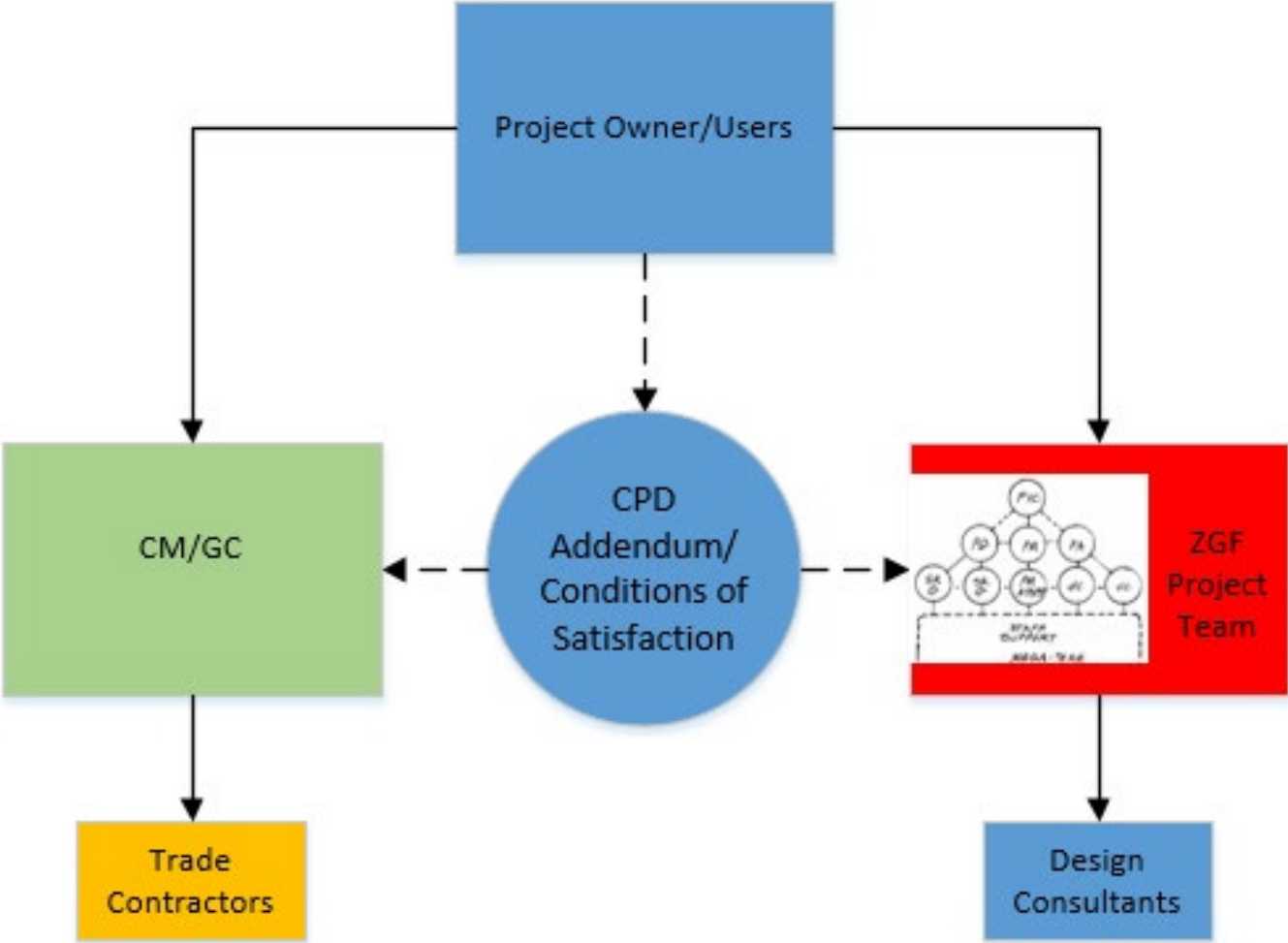


Figure 6 - Case Study #3 Project Delivery Formation



Clear Roles Takeaways: The frequency for communicating clear roles was commonly “often” for many forums including “all of the time” within the ZGF project team. To communicate clear roles with the design consultants, group messaging applications and 1-on-1 meetings were the most frequent, with the project meeting being the most frequent for the project team as a whole. The Principal-in-Charge responses agreed with several others on the ZGF project team. The design consultants, GC, and owner/users leaders were also aligned with these response when it related to the higher frequency of using 1-on-1 and project meetings.

Working Locations Takeaways: The design disciplines tended to work more in their organization’s 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 splitting their time between the three locations including remote. Four responses from Design Consultants and GC leadership indicate that they work more onsite than on similar projects, and the Principal-in-Charge 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 came from the Principal-in-Charge working with the design consultants and the GC/CM and a GC leader working with the ZGF project team.

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. While the design disciplines supported all forums, the responses from project team as a whole suggested the higher frequency communicating clear objectives in project meetings. The Principal-in-Charge and leaders’ responses appear to match the trends across the forums, and there was a scattering of responses with that used team building exercises.

Equal Accountability Takeaways: The design disciplines show high frequency for using project meetings and 1-on-1 meetings, with shared digital programs being “often” used by the ZGF project team. The responses from the Principal-in-Charge and leaders trend 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 of those surveyed had not worked with ZGF on a past project, and all the leaders have worked with at least two others on more than eleven projects. Some of the ZGF responses indicate little to no experience with 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 six years and work with other ZGF colleagues and industry groups. The Principal-in-Charge has a lot of experience working on ZGF projects, but only three of the nine ZGF project team responses indicate working with the Principal-in-Charge 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 Principal-in-Charge Takeaways: The Principal-in-Charge evaluated skills more than experience with assigning roles and was able to select the people they prefer. Sharing of accounting, scheduling, and the budget is shared often with the all the groups. The responses suggest the Principal-in-Charge had more participation in the creation of the budget than the ZGF Project Team and GC/CM.



SURVEY TAKEAWAYS: There is significant onsite participation from the ZGF project team, likely due to the projects remote location from their 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. 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 was more scattered across forums with less

frequency. The ZGF team had a range of experience within their team, and several project members had worked with each other on past projects. The Principal-in-Charge only has three responses from people who had worked with them on past projects, despite this individual working for ZGF for several years. The Principal-in-Charge also values skills when assigning roles on the project. The Principal-in-Charge 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 Recap

Case Study #1 – WSU Tri-Cities Team Formation Context

Working Locations

Working Locations	Occupying Team(s)
Main Office	Project Team as a Whole (all of the time)
Project Office	N/A
Remote	Project Team as a Whole (rarely)

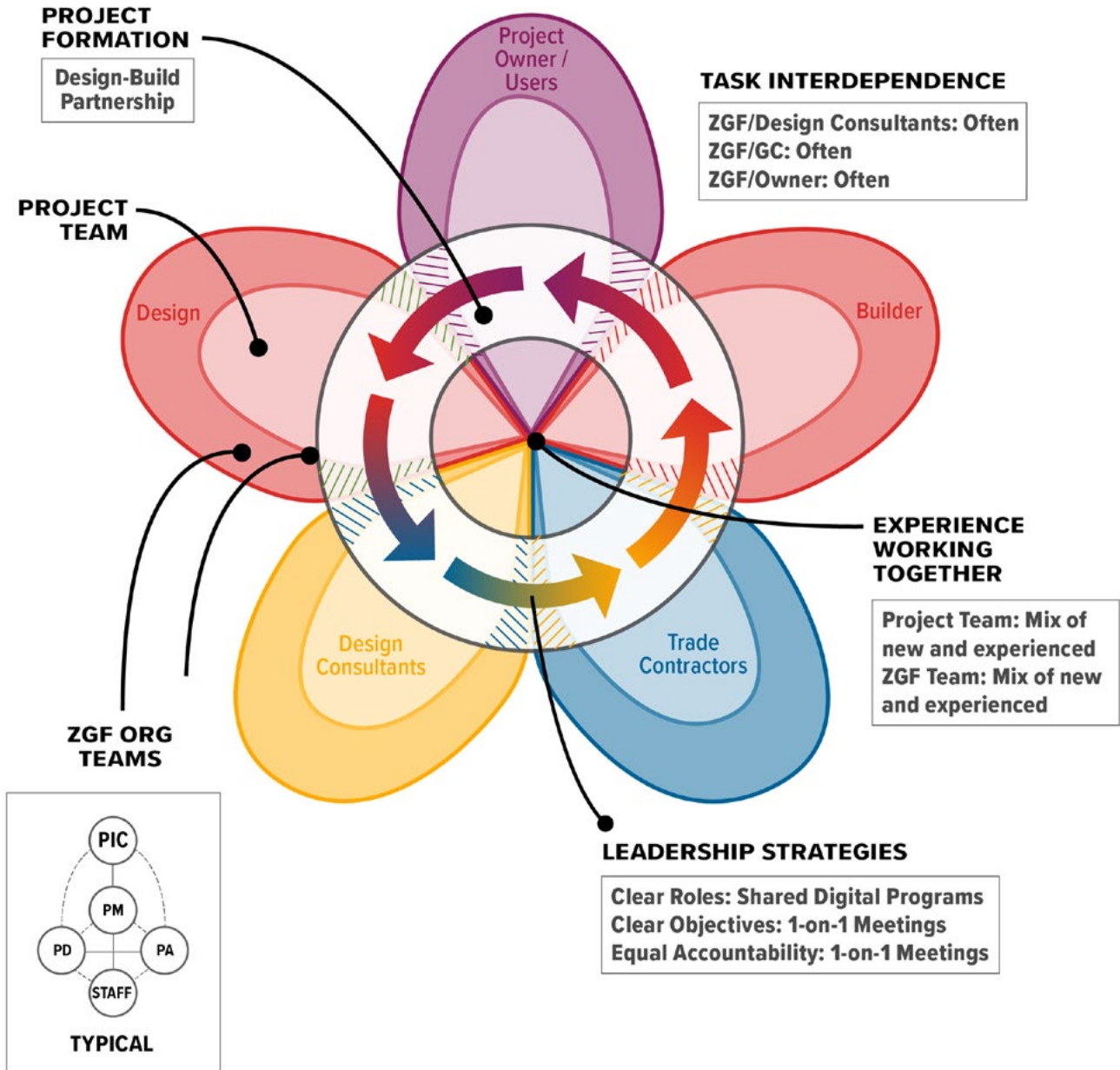
Team Experience

Team Formation Context	WSU Tri-Cities
ZGF Team Experience	New & Experienced
Project Team Experience	New & Experienced
Principal-in-Charge 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	Principal-in-Charge's Frequency of Use
Clear Roles	ZGF Team	1-on-1 - Often	Rarely
	Design Consultants	Shared Digital - Often	Sometimes
	Project Team	Shared Digital - Often	Sometimes
Clear Objectives	ZGF Team	1-on-1 - Often	Often
	Design Consultants	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
	Design Consultants	1-on-1 - Often	Often
	Project Team	1-on-1 - Often	Often

Case Study #1 – WSU Tri-Cities Team Formation Graphic



Case Study #2 – Seattle Children’s Forest B Expansion Team Formation Context

Working Locations

Working Locations	Occupying Team(s)
Main Office	ZGF & Design Consultants (all of the time)
Project Office	GC (all of the time)
Remote	ZGF & Design Consultants (rarely)

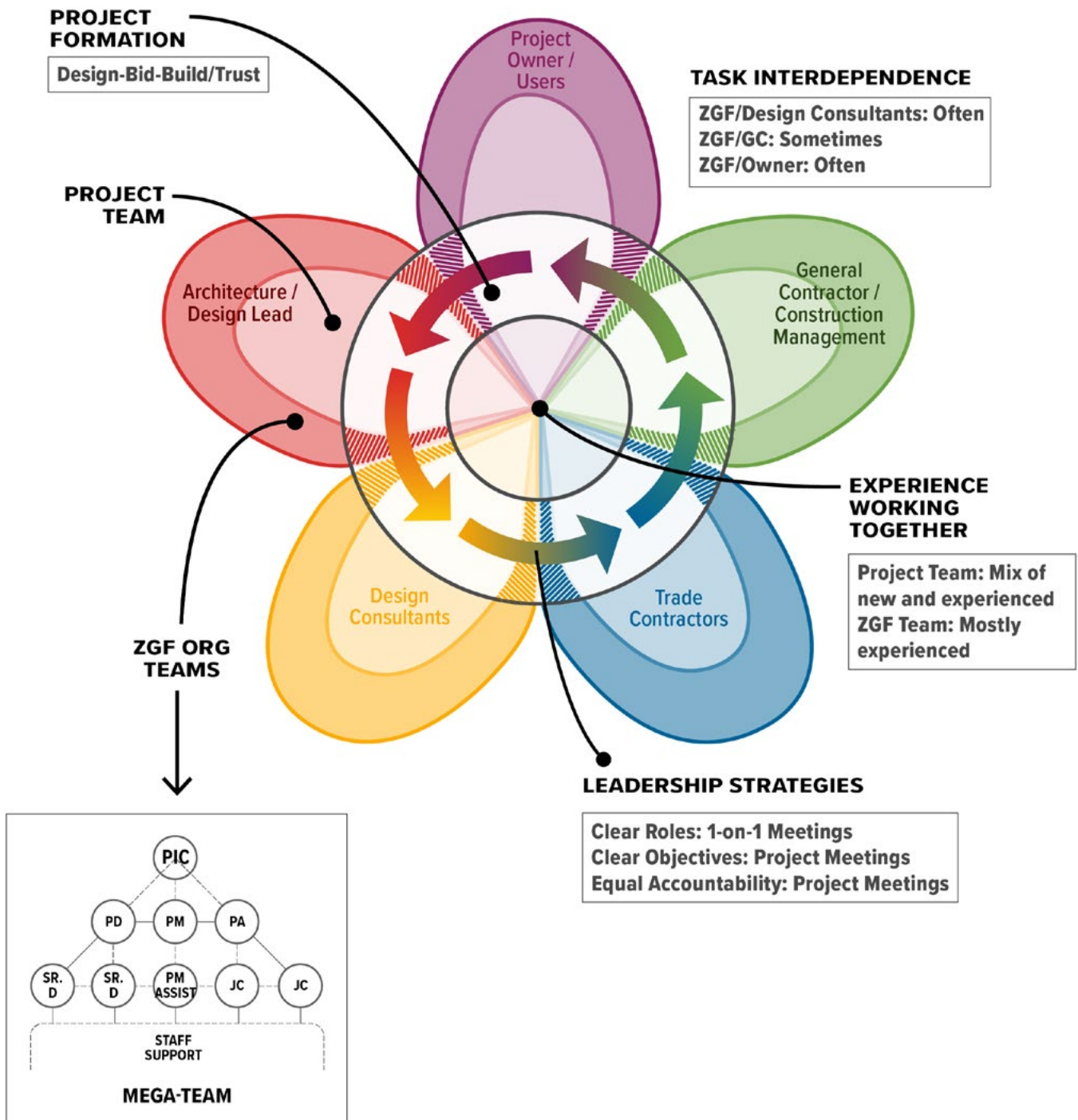
Team Experience

Team Formation Context	Seattle Children’s
ZGF Team Experience	New & Experienced
Project Team Experience	Mostly Experienced
Principal-in-Charge Experience	Experienced with PT, often chooses ZGF roles
Project Start Timeline	Slightly Later

Leadership Strategies

Leadership Strategy	Collaborating Group	Seattle Children’s	
		ZGF Project Team Frequent Forum	Principal-in-Charge’s Frequency of Use
Clear Roles	ZGF Team	1-on-1 - All of the time	Sometimes
	Design Consultants	1-on-1 - Often	Sometimes
	Project Team	Project Meetings - Sometimes	Sometimes
Clear Objectives	ZGF Team	Project Meetings - Often	Often
	Design Consultants	Project Meetings - Sometimes	Often
	Project Team	Project Meetings - - Sometimes	Sometimes
Equal Accountability	ZGF Team	Project Meetings / 1-on-1 - Often	Sometimes/Sometimes
	Design Consultants	Project Meetings - Often	Sometimes
	Project Team	1-on-1 - Often	Sometimes

Case Study #2 – Seattle Children’s Forest B Expansion Team Formation Graphic



Case Study #3 – Cincinnati Children’s Hospital Team Formation Context

Working Locations

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

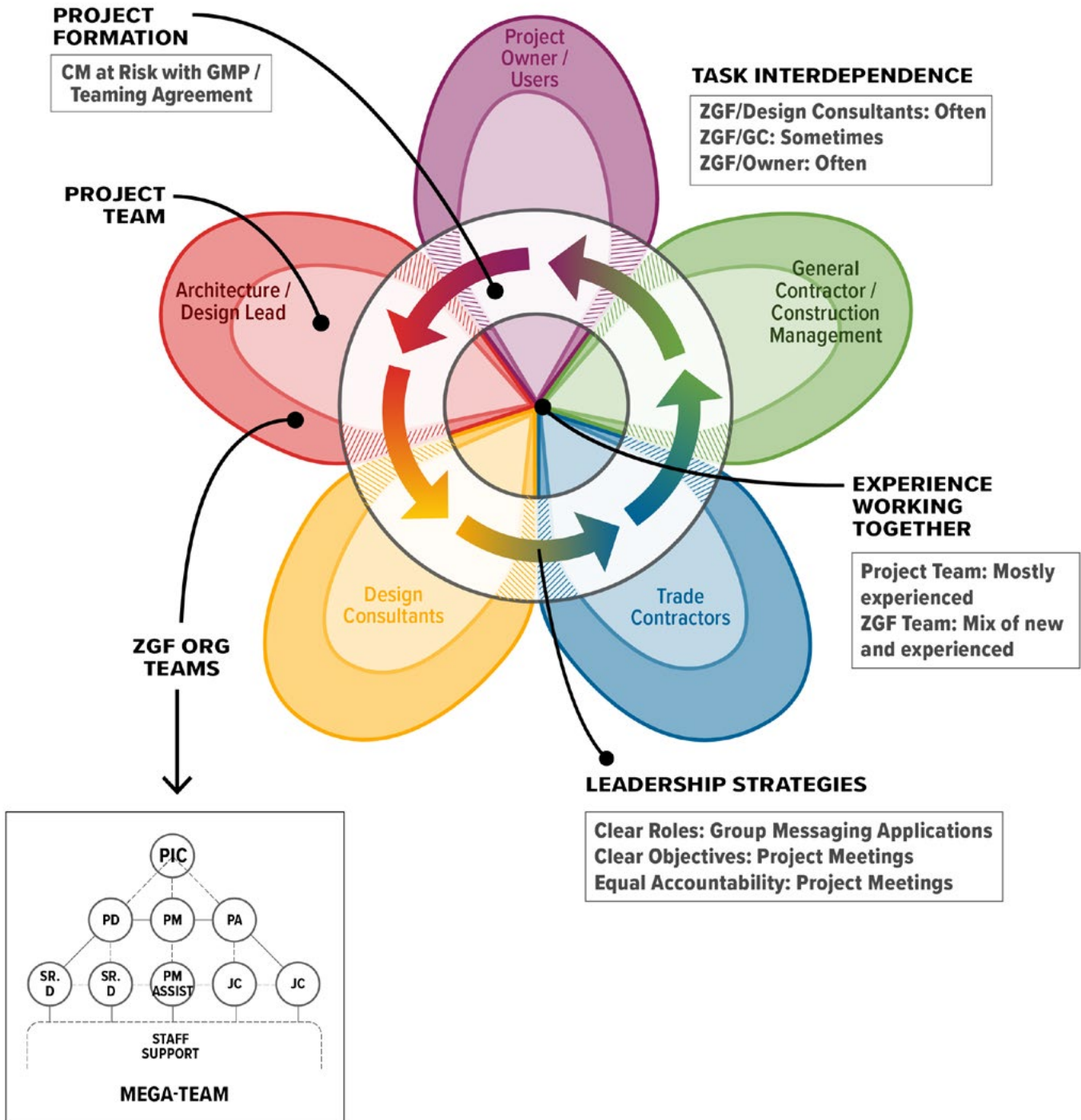
Team Experience

Team Formation Context	Cincinnati Children’s
ZGF Team Experience	Mostly experienced
Project Team Experience	New & Experienced
Principal-in-Charge Experience	Some experience with ZGF & PT, often chooses ZGF roles
Project Start Timeline	Slightly Later

Leadership Strategies

Leadership Strategy	Collaborating Group	Cincinnati Children’s	
		ZGF Project Team Frequent Forum	Principal-in-Charge’s Frequency of Use
Clear Roles	ZGF Team	Group Messages - All of the time	Often
	Design Consultants	1-on-1 - Often	All of the time
	Project Team	Project Meetings - Often	Sometimes
Clear Objectives	ZGF Team	Project Meetings - Often	Often
	Design Consultants	Project Meetings - Sometimes	Often
	Project Team	Project Meetings - Often	Often
Equal Accountability	ZGF Team	Project Meetings - Often	All of the time
	Design Consultants	Project Meetings - Often	All of the time
	Project Team	Project Meetings - Often	Often

Case Study #3 – Cincinnati Children’s Hospital Team Formation Graphic



Recommendations

Working Locations

Recommendation: Explore how to share spaces with individuals and groups that have a high level of task interdependency. Explore how emerging delivery models that creates new contracting relationships require adjustment in where the work gets done.

The individuals and groups with high task interdependency shared similar responses to work locations. 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 changing how project teams are reliant on others work. Finding spaces to work these emerging partnerships will include 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 due to the COVID-19 pandemic, the constraints of digital platforms has changed from optional to essential. 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 teams are using programs to create best practices and understand the value from the user's perspective.

Project Meetings

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

Project meetings were one of the most frequent forums used for communicating leadership strategies. Focused meetings with clear agendas including the right people and using tracking tools are important to lead to project successes. Meetings without purpose tend to be served by the people who are forced to attend such banal activities, and the meeting mentality you should be carrying should ask "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 leadership strategies to help with project goals, objectives and vision, the value of team building exercises should not be ignored. Not only could these exercises be included in project meetings to further propagate the objectives of the project, the opportunity exists to create more cohesion with the project team.

Leadership Strategies

Recommendation: Trust your gut and your teams. Every project is different and believe in the individuals and teams that are working directly with the situation to make the right decisions.

In the initial interviews, multiple Principal-in-Charge responses addressed the ability to use past experiences and trust your gut 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 team appreciate the complexity of

their situation to find ways to deliver their tasks. The various forums utilized for advancing leadership strategies suggest that traditional trends are highly valued as much as future trends like digital messaging platforms. This mix of experiences and preferences could be well utilized to share best practices, while still focusing on technological advancement.

Equal Accountability and Culture of Learning

Recommendation: Leverage transparency and a focus on improvement to reinforce the value of equal accountability, and encourage a 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 larger 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 work to improve, and a project without a culture of equal accountability has limited ability to develop a collaborative spirit of teamwork.

Future Research

Remote Teams, Technology and Collaboration

The COVID-19 pandemic has put an urgency on organizations, project teams, and individuals to work in more remote environments. Digital technology platforms where teams can share a variety of data, including designs, planning tools, and live conversations either as simple as text or as animated video, have allowed 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 the effects of 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

Project teams, including their internal and external partners, that are intended to form collaborative outcomes should also understand the boundaries of how teams are formed and leadership strategies can be applied. This not only applies to the

project teams that can be identified through formal contracting methods but also informal teams that could be forming as individuals are able to 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 how teams are working with each other? 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 individuals 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 Administration.

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

Table 4 - 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 within their own team. The colored ellipses represent the responses from the leadership per the results in the table given.

		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)?	
W S U	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
S C H	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
C C H	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 5 - 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.

W S U		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

S C H		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

C C H		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

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 as 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.

Table 6 - Clear Roles & Project Team

W S U		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/schedule/task planners/dashboards)?	Group messages applications (Microsoft Teams/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

S H C		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/schedule/task planners/dashboards)?	Group messages applications (Microsoft Teams/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

H C C		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/schedule/task planners/dashboards)?	Group messages applications (Microsoft Teams/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

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.

Table 7 - Clear Objectives & ZGF Project Team

W S U		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	
S C H		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	6	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	
C C H		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	

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.

Table 8 - Clear Objectives & Design Consultants

		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/operatives to task planners/dashboards)?	Group messages applications (Microsoft Teams/Slack/WhatsApp/Group Texts and Emails)?	Physical documents (drawings, storyboards, contacts)?	Team building exercises (project charters, project value creation, "ropes and dreams")?		
W S U	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	
			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/operatives to task planners/dashboards)?	Group messages applications (Microsoft Teams/Slack/WhatsApp/Group Texts and Emails)?	Physical documents (drawings, storyboards, contacts)?	Team building exercises (project charters, project value creation, "ropes and dreams")?		
S C H	ZGF Project Team	All of the time	1	1	0	1	1	0	
		Often	3	1	2	1	1	2	
		Sometimes	4	5	4	3	5	2	
		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	
			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/operatives to task planners/dashboards)?	Group messages applications (Microsoft Teams/Slack/WhatsApp/Group Texts and Emails)?	Physical documents (drawings, storyboards, contacts)?	Team building exercises (project charters, project value creation, "ropes and dreams")?		
C C H	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	

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.

Table 9 - Clear Objectives & Project Team

W S U		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/presentation software/slideshows)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "ropes and drama")?	
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	
S C H		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/presentation software/slideshows)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "ropes and drama")?	
ZGF Project Team	All of the time	1	1	0	0	2	1	
	Often	3	2	2	2	1	1	
	Sometimes	5	4	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	
C C H		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/presentation software/slideshows)?	Group messages applications (Microsoft Teams/Skype/Slack/Group Texts and Emails)?	Physical documents (drawings, storyboards, contracts)?	Team building exercises (project charters, project value creation, "ropes and drama")?	
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	6	
	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	

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.

Table 10 - Equal Accountability
- ZGF Project Team

W S U		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
S C H		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
I C C H		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	5	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

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.

Table 11 - Equal Accountability & Design Consultants

W S U		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/taskboards)?	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
S C H		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/taskboards)?	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
C C H		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/taskboards)?	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	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 12 - 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.

W S U		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/practices, task planners/dashboard s)?	Group messages applications (Slack/MS Teams/Skype/Slac k/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
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

S C H		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/practices, task planners/dashboard s)?	Group messages applications (Slack/MS Teams/Skype/Slac k/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	0	0
	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

C C H		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/practices, task planners/dashboard s)?	Group messages applications (Slack/MS Teams/Skype/Slac k/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 13 - Working Locations

W S U		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	90%-95%	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%	

S C H		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%	5	0	0	5	0	0	
	60%-80%	2	0	0	3	0	0	
	40%-60%	1	0	1	1	0	1	
	20%-40%	4	2	0	0	3	0	
	0-20%	4	4	4	0	5	3	
Never	4	3	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	

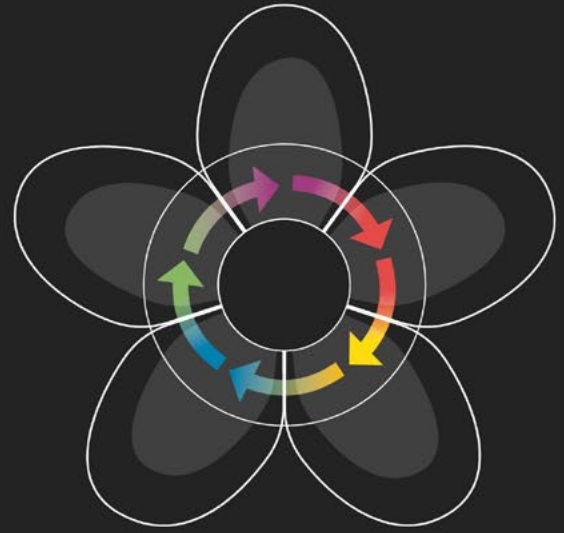
H C C		Working Locations						
		On this project, how much time do you spend in working in the following locations?			On typical/similar projects, how much time do you spend in working in the following locations?			
		Your Organization's Main Office	Onsite Project Office	Remotely (not in either your 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%	5	1	0	5	0	0	
	60%-80%	0	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	2		
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	

W S U		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
Design Consultants	Owner/Users	Often	Often	Often	Often	Often	Often	Often	Often	Often	Often
	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

S C I		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	7	2	5	5
	Sometimes	2	2	5	2	1	2	1	4	2	0
	Rarely	0	0	1	2	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

C C I		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	5	4	1	6	2	5	6
	Sometimes	0	2	4	0	3	0	2	4	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

Table 14 - Task Interdependency



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