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Analyzing Work in Project-based Organizations:
An Examination of Email as an Empirical Source for Activity-based Reflections

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Abstract

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This research explores and exposes how work email with associated attachments can be mined and analyzed to offer reflective assistance in the personal growth of individual workers and the collaborative projects on which they work. Through proper scaffolding of email related data and traditional project artifacts, organized against a theoretical backdrop of Activity Theory, one can illuminate naturally occurring contradictions resulting from collaborative activity systems and provide project workers with reflective tools that offer insights on collaborative networks, activity-based learning, and personal development. Using multi-method techniques including an archival study, a semi-structured interview, document analysis, and an in-situ case study, this research seeks to provide an assessment of workplace email and attachments in the hope of providing a repeatable process to structure, reflect, discuss, and learn from episodic content generated throughout the project lifecycle. Results from this research will offer new opportunities in the exploration of project worker data generated daily through email. It will help inform the development of tools for individual reflection on project work, provide qualitative assessments of the potential impacts such tools might have on a worker's development throughout project lifecycles, and provide a deeper understanding of design interventions needed to support individual project workers through collaborative practices.

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DEDICATION

For my family.

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Chapter 1. INTRODUCTION

In work-related research, as in practice, significant attention is focused on the tools, processes, and deliverables that result from collaborative work engagements. Although this research is instrumental in understanding, describing, and measuring the effectiveness of collaborative project work, a direct focus on the individual development of workers seems to be lacking. With the landscape of work in the US changing radically over the past 50 years (Davis, 2013), and the average time that a worker remains employed by a single employer decreasing, there seems to be a pressing need to focus on individual development in the workplace. The routine loss of human capital can result in significant impact to a company's bottom line. It is estimated that the average onboarding costs of a new employee can reach \$100K and take between 12 – 18 months before that investment realizes returns (Shiraz, 2011). Although the multitude of reasons affecting employee attrition is vast, one should not shy away from attempting to quantify or qualify contributing conditions. According to HayGroup (2013), which surveyed nearly 1.7 million U.S. employees within 152 organizations, lack of growth opportunities, fair compensation, supportive co-workers, and control over the direction of their work rounded out the top reasons that employees terminate their employment. Research that helps us understand how these personal conditions might be predicted, measured, or mitigated could not only be used by companies to foster better working environments, but may also provide grounds by which individual employees might reflect on their own work, their relationships with co-workers, and their potential career development. Employees of project-based organizations (PBOs) are especially prone to conditions leading to greater attrition. A PBO is defined as any organization where most or all business activities are undertaken in the form of projects and are prevalent in industries such as engineering, advertising,

construction, and film (Bartsch, Ebers, & Maurer, 2012). These industries rely on project-based teams to deliver innovative and novel products, and although the products are measured on traditional success criteria related to scope, time, and budgets, the workforce that produces the products are rarely considered. Given the relatively short temporal aspect of project work, the ever-changing team dynamics and network reconfigurations involved, and the significant organizational boundaries that require navigation, project-based workers are increasingly susceptible to working conditions that lead to conflict and potential attrition. “Difficulties arise due to the unique and discontinuous nature of project-based work which creates intra-firm boundaries that hinder the transfer and use of valuable knowledge gained within particular projects by subsequent projects and / or the project-based organization as a whole” (Bartsch et al., 2012, pg.239).

Little research has been conducted on the impacts to human capital stemming from unresolved conflict generated during collaborative cross-functional project work. With the richness of diversity among team members and the variations in socio-cultural work practices, the emergence of contradictions during project work are inevitable. How these contradictions are managed, however, can determine whether a team member profits from the learning potential that the contradictions provide, or whether the team member is left with unresolved contradictions that have potential to be perpetuated in negative ways in the future. Although my work does not focus specifically on the measurement of social capital, it does seek to provide individual project workers with the tools needed to reflect on their work, learn from their experience, and develop an increased awareness of project culture by sharing their findings with other project members through a common frame of communication.

1.1 STUDY SIGNIFICANCE

This dissertation intends to make contributions to the evolution of Activity Theory in support of episodic work analysis. Expanding on Yrjö Engeström's activity system model, this research attempts to empirically assess effectiveness of this modeling for the development of an individual subject and begins to dissect the useful application of the activity system for shorter term projects fraught with fluid boundaries between communities of practice. The activity system model should help articulate how project professionals use mediating artifacts to achieve project-based motives, sub-task goals, inclusion within the project community, and articulation and execution of a defined division of labor. A focus on email and attachments offers contextualizing meta-data that characterizes the artifact and its mediating potential as a boundary object in the realm of project work. Comparison of this derived activity system can be compared to more traditional representations of activity structure, like project charters and agile sprint stories, to highlight potential contradictions in individual and team-based understandings of project contributions. Understanding the role of artifacts in their lifecycle of design, introduction, acceptance, rebellion, use, misuse, or non-use between members of a project team will provide significant insights into the project collaboration capital that is generated or lost. As this research unfolds, I seek opportunities for guided reflection made possible through developing activity models, and hope to demonstrate that individual project workers can become more empowered to articulate contributions to projects while simultaneously identifying areas where improvement and personal development in the workplace are possible.

Meeting this agenda requires equipping project workers with a common methodology and toolset that surfaces empirical data related to episodic work, promoting guided reflection on that episodic work, and providing a consistent structure through which communication and reflection

with other project professionals can occur in an organized and consistent manner. My hypothesis is that these guided reflections will reveal personal insights into the ways that individual project-work practices are conducted and be capable of surfacing persisting social rules or constructs that shape their PBO.

1.2 RESEARCH OBJECTIVES AND QUESTIONS

This study is guided by three primary goals. The first goal is to determine whether workplace email can provide the necessary empirical traces of project work needed to develop a useful activity-based model for project analysis and reflection, and if so, develop a repeatable methodology that delivers organized findings to project workers. The second goal is to test the methodology to determine its effectiveness in helping an active project professional gain new insight into their project work. The final goal is to reflect on the lessons learned throughout the development and implementation of the methodology to determine what design modifications could be made, both technically and operationally, to better support project work reflection in real workplace environments.

To determine whether email can provide the necessary information needed to formulate activity-based models, the first phase of research employs an archival study of the EDRM Enron Corpus. In this phase, the corpus will be analyzed to answer the following research questions.

- RQ1 - What components of an individual's email can be used to inform and develop activity system models allowing reflective capability for project work?
- RQ2 - What components of the activity system are left underdeveloped through an analysis of email alone?
- RQ3 - What types of questions develop during the modeling exercise that would assist in the reflection process?

- RQ4 - What skills would be required on behalf of the analyst conducting this work to develop the reflective models?

To test the email supported methodology, the second phase will involve a semi-structured interview of a practicing project worker complete with a case study that analyzes one of their recently completed projects. In this phase, the research will be used to answer the following questions:

- RQ5 – Is the data derived from email capable of generating an activity system model comparable to models derived from other data extraction methods like interviews and document analysis?
- RQ7 – How does the worker’s project methodology impact assumptions about how email supports project-based analytics?
- RQ8 – What new insights does a working project professional gain by reflecting on email data organized by an activity system model?

Finally, the information synthesized will be used to propose a technical design that serves to make the proposed analytic methodology easier to administer and results easier to deliver.

- RQ9 – What design accommodations can be made to support the reflective analysis of email for project workers?

1.3 DISSERTATION OVERVIEW

This dissertation covers three distinct phases of work revealed through seven chapters.

Chapter 2 offers background and literature review on several components related to this research. First and foremost, there is a review of Yrjö Engeström’s activity system used as the model for organizational analysis of knowledge and operational work. Additional background on activity-

based systems, research on reflection in the workplace, the importance of boundary objects in project work, and the use of the Enron corpus to study email. Additional literature review is included in various chapters to provide support for emerging content.

Chapter 3 offers a review of methods used during my research. It begins with an overview of Engeström's activity system modeling method which I use to structure my data for reflection. I provide a high-level overview and justification for my use of an archival investigation and case study. I conclude with guiding principles supporting my choice for data extraction methods that include a semi-structured interview and document analysis. All these methods are used in support of developing and testing an adaptation of Engeström's activity system for project work assessment using email as an empirical source of workplace information.

Chapter 4 introduces an archival study of the EDRM Enron corpus that provides empirical evidence that project-based activity-centric models can be constructed using email and attachments when organized by the five process groups outlined in the Project Management Body of Knowledge (PMBOK). Sample modeling and questions derived from the work offers examples for reflective engagement with project professionals. Activity-centric models derived from email records offers project workers an approach to identifying contradictions within and across projects. Resulting models and reflective exercises can support project professionals with feedback loops aimed at improving how they understand their work and the collective culture in which it is produced.

Chapter 5 continues to explore the methodology for gathering and analyzing artifacts of episodic work based on email exchanges in the modern workplace and assess its ability to serve as a reflective protocol on actual projects. This approach supports the creation of activity-based models using the techniques described in previous chapters but will also addresses the challenges

of applying this approach to work in a contemporary organization. I introduce a case study of a multi-organizational project and a product manager's challenging experience to deliver online web experiences for third party clients. My case study involves three main data extraction events: (1) an interview and artifact collection event, (2) an analysis of a central project document, and (3) the application of the methodology developed in Chapter 4. Data from all three extraction methods are modeled using Engeström's activity system framework and triangulated to determine key tensions and contradictions impacting the project. Results are reviewed with the project worker to allow reflection on key themes and recommendations for future projects.

In chapter 6, findings from the archival research and case study are used to develop a data transformation protocol for email resulting in an activity-centric visualization called E.D.A.S. (Email Derived Activity System). The design protocol provides researchers with the ability to define certain aspects of project work to help frame email metadata needed to construct the activity models. The resulting visualization allows project professionals to reflect on associations between email data that would otherwise remain hidden in the message centric structure of workplace mail clients. I test the visualization with an active project dataset and offer the results of a brief usability study conducted with the contributing project manager.

Finally, chapter 7 revisits the original research questions and discusses the major findings resulting from the investigation. Lessons learned and contributions are summarized, and future work is outlined to further develop the assessment methodology for project work using email as an empirical source for activity-based reflection models.

Chapter 2. BACKGROUND AND LITERATURE REVIEW

Although more detailed background information is included in subsequent chapters, it is important to explore some key concepts central to the mission of my research. I introduce Activity Theory as articulated by Yrjö Engeström and discuss its ability to assist in work-related research by making work visible for reflection. I review notable examples of research using Activity Theory and highlight the limitations encountered when attempting to analyze project work. I explore the complexities of project work ranging from the multiple methods employed during coordination, to the significant usability gaps in project management applications. I detail background on the concept of artifacts and boundary objects to highlight their crucial role in mediating collaborative project work and discuss their necessity in bridging the gap that project management applications fail to address. Having identified email as a possible source of empirical investigation for project work, I review studies related to email and one of the few publicly available datasets for email research, the Enron corpus. Examination of email is meant to highlight the structural limitations that must be conquered to empirically examine email as the primary vehicle for transporting project artifacts across organizational boundaries.

2.1 REFLECTION, ACTIVITY THEORY AND WORK-RELATED RESEARCH

2.1.1 *Reflection and the Professional*

The notions of reflection and contradiction are closely associated with learning and development. According to Moon (2013), reflection is seen as a basic mental process with a purpose or outcome, that is applied in situations where material is ill structured or uncertain and where there is no obvious solution. The work of Donald Schön (1983, 1992) focuses on the importance of reflection for working professionals. In his call to supplant the positivist leaning epistemology of

professional practice being perpetuated through educational institutions and professional schools, Schön looked to the act of reflection to offer a way to explain how working professionals not only learn but develop working theories through practice. According to Schön, in professional environments (like project-based organizations), work is rarely routine, leaving espoused theory taught in educational institutions unable to mediate the tasks at hand. He offered two central concepts labeled reflection-in-action and reflection-on-action to help explain how professionals reflect during work in hopes that his insights might support alternative approaches to professional development. Reflection-in-action refers to an act of reflection during an activity, as the subject encounters something unexpected, reflects, and immediately pivots the action to a more desirable state. Reflection-on-action occurs after an activity has taken place and has a role in learning and theory building. Together these forms of reflection create a cyclical relationship of immediate and long-term evolution that allows a professional to quickly adapt to work that is non-standard and non-routine while simultaneously developing theories of use that can be carried into future endeavors. In a review of Schön's contributions to the study on reflection, Moon (2013) critiques the narrow view that Schön takes with his concept of reflection-on-action and claims that for practice to evolve, reflection must extend beyond the activity to include material that is new or learnt from other situations, material gained from formal situations or even espoused theory. She also notes that the academic community has engaged in constructive debate about the properties of his concepts of reflection, however very few have offered a way to operationalize them.

A theoretical construct that both supports Schön's concept of reflection-on-action and offers a way to operationalize it through methodology is Activity Theory. The concept of learning through contradiction is rooted in Activity Theory, a dialectical materialist psychology developed by Lev Vygotsky in the formative years of the Soviet Union in the early 1920's

(Bertelsen & Bodker, 2003). Researchers have found Activity Theory a productive framework for structuring studies over the last 20 years (McNely et al., 2015). Popularized in the west by Yrjö Engeström (1987) as a method to make complex work visible through activity system models, Activity Theory has been used to improve work in healthcare (Engeström, 2000), engineering system design (Collins, Shukla, and Redmiles, 2002), workplace communications (Spinuzzi, 2013), and as part of a conceptual framework for understanding how digital tools like email mediate, shape, and organize the very nature of work (Swartz 2013). The modeling capability of Activity Theory provides a consistent framework for guided reflection that allows results to be shared and compared in a consistent manner with other project members. The structure also allows reflection to occur at multiple levels of an activity while maintaining relationships between components that make up the activity. My research does not suggest that reflection cannot or should not be conducted in any manner useful to a project worker, I merely make the case that a common frame is helpful, if not required, when reflecting on team based project work so that lessons learned through an individual team member's reflection, can be aggregated, shared, and discussed with other project members who experienced the same activity through their own experience. Although the structure associated with activity may seem limiting when compared to more free form methods of reflection, I contend that the skeletal structure provides an important frame that leaves room for the connective tissue of reflection and analysis and offers a pathway for an individual to share and compare findings with a similarly engaged community.

2.1.2 *The Genesis of Activity Theory*

The origins of Activity Theory are important to understand if we want to examine how the theory has developed over time and how social scientists have used it for analyzing individual

activities, mediating artifacts and technologies, human interaction and learning, group dynamics in collaborative activities, and organizational infrastructures. It is also crucial to understand its origins to navigate the competing post cognitivist approaches often used to analyze work in these domains. The object of activity theory is to understand the unity of consciousness and activity. Activity theory incorporates strong notions of intentionality, history, mediation, collaboration, and development in constructing consciousness. Activity theorists argue that consciousness is not a set of discrete disembodied cognitive acts (decision-making, classification, remembering), and certainly it is not the brain; rather, consciousness is located in everyday practice: “you are what you do” (Nardi, 1996 p.7).

Activity Theory provides the orienting framework and modeling capability necessary to collect, assemble, reflect, and learn from work-related objectives. It provides a structure that makes the interconnected aspects of work visible. Influenced by Marxist philosophy, Vygotsky set out to understand and explain the mental capacities of an individual human during development. He posited that culture and society were not external factors influencing the mind but were generative forces directly involved in the production of the mind (Kaptelinin & Nardi, 2009). He believed that the only way to reveal the impact of culture on the mind was to follow developmental and historical transformations in social and cultural contexts. He found that activity was the smallest unit of measure that should be studied to understand these integrating dimensions. Through his research on the evolution of the psyche he introduced the concept of the object of activity. He established a strict relationship between the human subject and the objective of his or her activity, achieved through the mediation of tools. In his work, human activity is the primary unit of analysis to decode human development. Beyond the subject-object dimension and the importance of tool mediation, another key component of Activity Theory involves the process of internalization and

externalization. Externalization is the process of displacing internal knowledge into external artifacts so that they can be used as future mediating tools in an activity, while internalization is the reverse, encountering external artifacts (all residuals of human activity) and appropriating the affordances into new internal mental models. It is through this cyclical experience of learning from the artifacts of the world, then contributing new artifacts to the world that others can then internalize that speaks to the very nature of human development in a social world. Although different in its approach and terminology, the concepts of internalization and externalization provide a description of what is likely occurring during Schön's concepts of reflection-in-action and reflection-on-action. The cyclical process of internalization and externalization is what makes activity a recursive and emergent process in the cultural, historical, and developmental process of human development. Through the study of activity and its resulting artifacts one can witness the manifestation of the human mind within the environment and begin to reflect on the learning trajectory of an individual through the contradiction of intentions and results. Reflecting on mediating artifacts is key to the analysis of human learning.

2.1.3 *Activity Theory and Work-related Research*

It would be the work of Yrjö Engeström that brought Activity Theory to the forefront of work-related research. Engeström is responsible for what is known as the third generation of Activity Theory, commonly referred to as CHAT (Cultural Historical Activity Theory). Engeström expanded the original work of Vygotsky and produced a visual model that represented the mediating aspect of activity. The artifact was a simple triangle where one point of the base represented the human subject, the second point of the base represented the object or focus of the activity, and the top point of the triangle represented the tools used to mediate the motivated objective. Understanding that individual humans do not develop in a cultural vacuum, Engeström

would expand the concept of activity further to incorporate the collective experience through the addition of community. As *tools* mediated the relationship between the individual *subject* and the *object* of an activity, Engeström posited that *rules* mediated the relationship between the individual *subject* and its associated *community* within the context of the activity. To complete the concept of the collective, Engeström posited that a *division of labor* mediated the relationship between the *community* and the *object* of the activity. When completely envisioned, Engeström referred to this collective view of activity as an “activity system,” the most complete unit of analysis to be studied if activity were to be understood from a cultural and historical perspective. In fact, the focus of his organizational and collaborative work often involves analysis of a minimum of two interacting activity systems, where the object in this model is seen as moving from an initial state of unreflected, situational "raw material" to a collectively meaningful object constructed by the activity system, and to a potentially shared or jointly constructed object. The object of activity is a moving target, not reducible to conscious short-term goals (Engeström, 2001p.136). His focus centers on the collective motive of the object, an object that can be shared across boundaries of activities. He refers to this co-configuration of work and activities as “knotworking.” The structure of activity and associated modeling diagrams will be discussed in further detail in Chapter 3.

With Engeström’s altered unit of analysis moving to a macro view of work, the role of the human subject becomes a bit muddled. It no longer represents a single individual but a conglomerate of human subjects representing stakeholders within the activity. His concept of knotworking reveals situations in which individual members of the collective subject alternate in the expression of agency for the given activity leaving us with a gap that addresses “individual” development and learning, a core intention of the original fathers of Activity Theory. The fluidity of the subject works well for the empirical work of comparing contradictions between large competing systems

of understanding, but the activity system concept has not been employed to study isolated individuals. In its current empirical employment, Engeström's activity system lacks the power to address major concerns of collaboration in project work, where the activity systems presented are short in configuration and the collaborative teams are assembled for a short time. Knotworking only addresses long standing and historically rich activities, leaving us without answers to questions of collaboration in today's work environment where work is short lived, hobbled together across diverse boundaries and representing culturally and socially diverse subject perspectives. This study aims to stabilize the concept of the subject as a single individual and use Engeström's activity system model to demonstrate additional utility in the reflective learning of independent project workers. My focus does not suggest that a macro view of activity is not warranted, I merely maintain the individual subject so that they can be aggregated for macro analysis without sacrificing the micro level detail.

2.2 THE COMPLEXITIES OF PROJECT WORK

Activity Theory has proven effective in modeling complex work systems where the routine of work is empirically visible for long periods of time, allowing observation and assessment. A project by its very definition is an episodic phase of work, often scoped to detail various work tasks and resources required to achieve the desired outcome. A single project-based organization (PBO) could easily be involved with multiple projects simultaneously, each requiring negotiation and collaboration with multiple organizational partners. Each temporary configuration of work becomes a unique response to a posed challenge. No two projects are identical, and the specific requirements of a project often requires collaboration and compromise across organizational boundaries, resources, and tools. How this is negotiated can mean the difference between a successful project that is delivered on time, on budget, and within scope, or a disastrous project

that fails on one or many of these criteria. Given the short duration of this type of work, compared to more routine types of labor associated with knowledge work or operations, and the intense variability found in the pulsating configurations of organizations, project members and resources, project work remains difficult to visualize, observe, and study. These are not the only factors making project work complex and difficult to study.

2.2.1 *Multiple Project Management Methodologies*

The discipline of project management has developed multiple methodologies in response to the variations of episodic work it supports. Most project professionals can easily divide their project work history into two distinct categories of waterfall and agile. Projects managed through a waterfall approach are typically planned through detailed requirements in their entirety up front, executed over longer periods of time, and facilitated with robust documentation. Projects managed through agile approaches are typically planned through very short defined cycles of work, executed in an iterative fashion, and facilitated with minimal and targeted documentation. Within each of these two categories, several specific workflow methods have developed. Shaydulin, and Sybrandt (2017) compared a standard waterfall approach to project management and various agile methods (Agile Unified Process, Scrum, Test Driven Development, Rapid Application Development, Joint Application Design, Feature Driven Development) to determine their ability to meet a series of criteria related to agility and quality. They found that not one of the agile methodologies could entirely replace the waterfall framework and that, agile methodologies were unable to cope with the real-world technical debt and large-scale systems. The proliferation of methodologies makes projects difficult to manage, especially when dealing with the globalization of technical design and development projects. As project professionals become accustomed to certain methods of project work, their preference for that method can make

collaboration difficult when partner organizations prefer alternative methods. Project success is highly associated with adopting a project management methodology that not only works for the substance of the project, but also for the teams and systems navigating that substance. Many collaborative projects fail because the independent methods used by individual project partners do not align, resulting in communication failures and sequencing issues.

Recognizing that the discipline of project management is used across multiple industries and that methods need to be abundant and flexible to meet variable demands, a body of knowledge was developed to provide a cohesive framework to project work. The Project Management Body of Knowledge, or PMBOK, (Rose, 2013) offers a set of field-recognized certifications and practices to project management that structures project work regardless of size, industry, or methodology. Breaking project work into 5 distinct process groups of work (initiating, planning, executing, monitoring, and closing) the PMBOK offers a comprehensive framework to project work that is robust enough to address the largest of projects and flexible enough to address smaller projects or even parts of projects. The PMBOK offers a centralizing reference for project work, however it should be noted that as project work becomes more specific in certain fields alternative references are developing. In the realm of technical development projects, another guiding reference known as PRojects IN Controlled Environment Version 2 (PRINCE2) has become widely adopted in the UK and Australia. Karman and Kurt (2015) offer an empirical comparison of the two guiding references, finding that the PMBOK provides a more comprehensive approach with detailed techniques, but that PRINCE2 offers distinct features like project board integrations and approaches to management by exception, that the PMBOK lacks. I will use the PMBOK throughout my research as a means to centralize key concepts of project

management, but recognize that competing paradigms might interfere with how some project professionals might choose to categorize and enact various phases of project work.

2.2.2 *Project Management Applications and the Need for Gap Artifacts*

The abundance of project management methodologies is not the only factor that can make project coordination and collaboration challenging. To appreciate the variability in context that one encounters when attempting to study project work, one needs to look no further than the portfolio of project management applications available today. Kashyap (2020) compiles a list of the top 51 project management tools currently available, highlighting key advantages of each. Although the ranking and assessment of each application provides interesting information to consider when adopting a project management tool, the important fact to consider is that a non-comprehensive list of applications meant to support project work can generate a list of over 50 unique applications. Each application offers slight variations on features meant to distinguish its offerings from competing projects. A relatively recent study by Sajad, Sadiq, Naveed and Iqbal (2016), compared seven popular project management applications against IEEE Standard 16326-2009, which provides specifications for project management plans covering software projects. They found that only 63% of the features outlined in the IEEE standard for software development projects were in fact met by the project management tools analyzed. 37% of the features outlined by the standard were not covered by standard project management tools. The gaps identified in this study, although significant at 37% of features called for in IEEE Standard 16326-2009, are even more significant when you consider that the gap is identified across all applications analyzed where an individual application might lack all but one of the features where another application might support a single feature and lack all others. Key features that were not supported by any of the applications analyzed include planning activities (staffing, training, procurement), execution and control activities (scope

change control, subcontractor management) and supporting activities (project supervision, decision management, information management, quality assurance, measurement). The lack of support across project management applications to fully address execution and control activities is of significant concern when the project involves collaboration of work across departmental, organizational, and international boundaries. Although more recent research and a wider array of tools should be studied to support these initial findings, it is obvious that the project management discipline has yet to identify a trusted handful of applications that meet the majority of the variable demands that project work requires. The problems created by lack of a central representative system are only compounded in multi-organizational projects where each organization has culturally appropriated their own choice for the application best suited for their project needs. How do three companies using three different project management applications efficiently collaborate on a joint project? Competing applications and absent features are routinely accommodated in multi-organizational work by custom project tools created specifically to fill an operational or communication gap within a project, or routinely recycled from project to project to address systemic deficiencies. As new tools are created or appropriated, their use within the project management lifecycle can introduce several contradictions to the preferred flow of work. A focus on emerging tools situated for specific project purposes can provide substantial empirical support for project work analysis especially as they are developed and shared across organizational work boundaries.

2.3 MEDIATING ARTIFACTS IN CROSS-BOUNDARY PROJECT WORK

With Activity Theory placing significant emphasis on the mediating role of tools, compounded with the revelation that core project management applications lack the necessary features to satisfy all aspects of project work, a deeper assessment of the role of tools in collaborative work

is warranted. Star and Griesemer (1989) introduced the term boundary object in their research exploring collaboration among individuals during the development of Berkley's Museum of Vertebrate Zoology. They introduced boundary objects, as an analytic concept of objects which both inhabit several intersecting social worlds and satisfy the informational requirements of each of them. They are plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. These objects are weakly structured in common use and strongly structured in individual site use. They may be abstract or concrete. They have different meanings in different social worlds, but their structure is common enough to more than one world to make them recognizable. The creation and management of these objects is a key process in developing and maintaining coherence across intersecting social worlds.

The role of these boundary artifacts are critical in the development of: learning by bridging and brokering competence and experience (Wenger, 2000), the facilitation of collaborative work on the production floor (Bechky, 2003), the management and flow of temporal work across geographic, cultural, and departmental boundaries (Harper, 1997), practices that strengthen online communities (Wellman et al., 2002), as sources of power and suppression (Kimble et al., 2010), and interactions required to support articulation work across project stakeholders (Strauss, 2003). All these processes are collaborative in nature and require facilitation, negotiation, and grounding between communities divided by borders of ambiguity. In the workplace, artifacts often absorb, reflect, and embody the cultural historical nuances of contextual practices. They come to represent thought, work structures, power dynamics, and history itself. In project work, these boundary objects become critical to aiding the collaboration of culturally distinct organizations committed to a central motivation or objective. Email is currently the most

ubiquitous method of transmitting these artifacts across the organizational boundaries of work. It should be no surprise then that my research will focus on attachments transmitted through email as a critical source of empirical information that informs the activity-centric structure of project work. A review of the literature provides many examples of work-related research that looks specifically at the role of artifacts and documents in project-based collaborations. Pointing to some key examples helps highlight the importance of documents and artifacts in the workplace and orients the ways attachments in email may be used to derive a more activity-centric structure for analysis.

2.3.1 *Project Artifacts and the Role of Email*

Østerlund, Sawyer, and Kazianus (2010) offer many insights into the wealth of information that one can obtain from documents through their study on coordinated action in the workplace. Although their research could be considered a bit controversial, in that they studied their own documents, their findings hint at several areas where the study of email attachments could be quite beneficial. One finding was that work documentation seemed to cluster around meetings whether they were face to face or virtual. They found that email traffic and changes to electronic folder content had a substantial increase in activity the day before a meeting, during a meeting, and right after a meeting. This supports the notion that individuals who send email with attachments are externalizing their work and that the email content and attachments could serve as great artifacts of study in translating historical activity. The authors studied the content of work documents because, “Studying documents in work allows us to position people’s immediate activities and situated routines in their larger social and organizational context. As documents carry institutional structures and point to both past and future activities, they open a window to larger organizational practices.” (Østerlund et al., pg.1) The authors also share that

many other factors can be gleaned from a work document beyond its content. “The content of a document is not the only marker of its manifest relations. Their temporal, spatial, and material position also makes a difference in terms of what relations a document calls attention to and what is left unexplored” (Østerlund et al., pg.6). Their work also highlights many challenges in studying email, as distributed collaborators often use different email clients and operating systems, making it difficult to implement them on participant computers. They suggest that researchers configure participants’ email clients to automatically copy a research account on all sent messages, but that the researchers must filter out emails not pertaining to the study. Although an analysis of emailed attachments may limit the holistic view of coordination and collaboration in action, it still provides an excellent repository of information related to the individual worker’s action and development within a larger activity system. It would be ideal to triangulate all sources of information raised by the authors to understand a more comprehensive frame, but it should not dissuade research such as this, in attempting to make incremental advances in the structural understanding of how email might be used as a proxy indicator of activity in general.

Other researchers have attempted to demonstrate the importance of artifacts and documents in the facilitation of project work. Kuhrmann, Mendez-Fernandez, and Grober (2013) conducted a literature review to derive a suggested model of artifacts used across agile project methods. Their objective was to help reduce the fragmentation of work often experienced in agile projects by demonstrating the value in documentation, however minimal, and to find a suggested model of documentation that supported best practices. Millen, Muller, and Ehrlich (2004) conducted research into the types of media that best supported environments of activity-centric collaboration. Mason and Leek (2012) also studied communication practices in business

relationships through a study on media types and the best articulation of artifact / media combinations. Their interaction frame included information exchange, problem solving, negotiation and adaption, idea generation, crisis insurance, social interaction, and assessments. Email was found to be ideal for interactions involving information exchange, an interaction that is critical to coordination and project work.

Hussain and Clear (2014) conducted research on the role of spreadsheets as mediating artifacts in the activity of global requirements management. The authors note that the requirements management process depends on collaborative artifacts to reduce communication barriers caused by differences in geography, time, and culture. The authors hoped to find a structure that members of the activity could recognize, adopt, and employ as a boundary object. Just as this dissertation attempts to provide an activity-centric structure to email in order to give project workers a frame of comparison to traditional project-based artifacts, so too did these authors attempt to uncover a dedicated tool or structure that could specifically aid in the reduction of informal communication and collaboration across a given activity.

In attempting to find research that directly focused on the analysis of mediating attachments in email, only one example could be uncovered. Dredze, Blitzer, and Pereira (2006) pioneered an attachment prediction system to reduce the volume of missing email attachments (a common feature now available in most email clients). Their research did not involve actual attachments since the original Enron corpus they used during their research did not contain them. Instead, the authors prepared a unique assessment of the corpus from the governments original data dump and used a coding technique to indicate the presence of one or more attachments. Although exact guidance on analyzing email attachments could not be gleaned from this work, several features of emails were raised that must be kept in mind when attempting to work with it as a defined

data set. The authors noted several difficulties when attempting to analyze attachment affordances in email, namely that some emails are forwarded as attachments in their entirety, machine generated email can cause noise, some emails contain embedded artifacts instead of attachments, and some email clients embed residual artifacts for routing purposes. These issues will likely need to be accommodated throughout my research when attempting to extract attachments for analytical purposes.

As can be seen throughout the research on artifacts in the workplace: they are often critical in bridging project work, they are often enshrined in a common media for information exchange like email, they serve as historical breadcrumbs to the activity and process that created them, and their very presence, location, and distribution network can reveal a lot about the activity system that houses them. This work does not specifically investigate collaboration through artifact analysis, but it does posit that artifacts found in emails can play a large part in identifying an activity-centric structure, even if a proxy, to help orient the artifact in a way that project workers can reflect and learn from its utility in a broader project-based activity system. Since email offers a near ubiquitous tool for sharing project artifacts across organizational boundaries, and artifacts are key component to activity-system analysis, I further explore previous work related to email that I might gain better insights into the affordances and constraints encountered when navigating its structure for analytic purposes.

2.4 THE SOCIAL AND STRUCTURAL STUDY OF EMAIL

“Email has been with us in one form or another since the earliest days of computer networks and bulletin board services. From inauspicious beginnings, it became one of the three “killer apps”, along with Telnet and FTP that gave the Internet its momentum.” (Berghel, 1997 pg.11). In an era of unprecedented development that offers researchers an endless stream of new technologies to

explore, it may seem banal to focus on email, a technical media that is older than many of the people studying technology today. Although the exploration of newer technologies that offer workers new ways of coordinating, collaborating, and communicating is important, it is unwise to leave such a ubiquitous media unexplored when it continues to dominate workplace communication. Juhász (2012) found that people working with information send and receive on average 133 emails per day, consuming nearly 21% of their total working time. Although the utilization of email has increased over the it is startling to realize that the same challenges documented nearly 20 years ago remains a challenge today. Berghel (1997) documented beneficial features of email like speed, reduction in transmission delays, sustainment of communities of practice, paperless archives, and user centered communication control. These benefits continue to enable email's dominance in workplace communication. The less desirable qualities like information overload, interpersonal abuse due to convenience, mass-mailings, access and privacy concerns, and security threats related to attachments, remain a persistent problem today.

2.4.1 *Personal Information Management and the Complexity of Email Structure*

Researchers in Personal Information Management (PIM) have explored the social and structural consequences of email while attempting to improve design characteristics. Whittaker, Bellotti, & Gwizdka (2006) offer an excellent critique of email's challenges in relation to three main functions involved in PIM: task management, personal archiving, and contact management. These three areas may seem simple and intuitive, but each area is rich with social strategies, exploitations, and emergent accommodations employed by users to overcome inherent challenges for a communication media that was never designed or intended for personal information management.

Task management involves maintaining relevant information on work-related tasks through reminders and status tracking. “We leave information about current tasks there (inbox), knowing that when we open it and scan its contents, we’ll be reminded about outstanding tasks. We even send ourselves email to put messages in our inbox as reminders and perhaps as links to useful information. Some of us also organize email relating to current tasks into active folders, returning to them as needed.” (Whittaker et al., 2006, pg.70). The authors note that task management in inboxes becomes increasingly difficult as the size of the inbox increases. The more messages that accumulate results in a decrease in saliency and accessibility. Although most email clients provide search features, search is only useful from a task perspective if the user has a task in mind. Search is not helpful when we depend on visual cues to be reminded of a task. The authors note that recognition is an important part of task management. In addition, email threads, which help provide contextual clues, are difficult to maintain and organize given the variant usage and response patterns across an email’s contact network.

The second function of PIM is personal archiving which involves strategies for storing and retrieving important task related information. Typical personal archiving strategies center on folders, search parameters, and sort functions. Whitaker et al. argue that the affordances of personal archiving do not adequately support the cognitive process: “Manual classification is a cognitively difficult task requiring users to be able to predict future usage contexts. As a result, users are often inconsistent in their classifications and may also forget the existence of their own long-term folders.” (Whittaker et al., 2006 pg.71). The authors propose a solution of assisted filing, where machine learning techniques categorize incoming messages and make suggestions based on current file structures.

The third and final function of PIM is contact management which involves the maintenance of a ready and accessible list of social and work-related networks. This function is the central reason why email remains the de facto communication conduit in the workplace. It provides the ability to save incoming contacts and their associated delivery address while making it very easy to initiate communications, reply to senders, and forward messages to associated contacts. Proper contact management makes information sharing extremely simple. It is so simple in fact that the more entries in the contact management system of email, the likelihood of information overload in your inbox is quite likely to occur. Across all three areas of PIM, and associated with information overload, Whittaker et al. discuss the most salient problem for email users as being fragmentation, which results when information delivered through email is left there and not directed to PIM applications like CRMs, calendars, file systems, etc. They raise two specific strategies for dealing with fragmentation. Centralization addresses fragmentation by locating all PIM functions within email, an effort that Microsoft has attempted with MS Outlook, providing coordinated task management, calendaring, and contact management within one platform. The second strategy is information extraction which aims to migrate PIM information from email into a dedicated application that provides direct and intended support for PIM. This strategy is often problematic because users encounter information first in email and need the originating context for reminders and continued discovery. PIM applications tend to divorce attachments, contacts, and events from the contextualization and temporal aspects provided in the email, including its organizing attributes like sender, recipients, dates, and headers. Since this research aims to enhance learning and reflection through email directly, a focus on techniques of centralization seem to be most appropriate.

2.4.2 *Research on Email Using the Enron Corpus*

The Enron Corpus, a collection of Enron employee emails made public by the Federal Energy Regulatory Commission during the investigation of the Houston based company's collapse between 2001 and 2002, has quickly become the golden standard in research related to email. The corpus was introduced by Klimt and Yang (2004) in their study on text learning and automatic folder classification, followed shortly by Shetty and Adibi's (2004) research on link, network, and textual analysis. Both sets of researchers set out to begin analyzing the structure and associated content and were instrumental in helping provide enhanced database structures for further analysis. The original corpus was made possible by the original collection prepared by Melinda Gervasio at SRI for the CALO (Cognitive Assistant that Learns and Organizes) initiative. William Cohen from CMU made this dataset widely available to researchers and still maintains revisions to the corpus today (Shetty & Adibi, 2004). The original corpus contained over 500,000 emails from 151 users, distributed across 3500 different folders. The corpus has been used across many research explorations since its introduction. Klimt and Yang (2004) yielded a cleaned corpus about 1/3 of the original size and has continued to use this amended source for research in email threading classification, filtering based on user priority, assigning messages to user-created folders, and identifying SPAM. Shetty and Adibi (2004) generated a cleansed dataset in the format of a MySQL database that has been routinely used for statistical analysis related to employees, messages, recipient structures, and the actual text of the email content. Their work has shown that between the included dates of 1998 and 2002 employees received many more emails than they sent and showed an increase in email transactions between April and November of 2001. They also used documents issued by the United States bankruptcy court, southern district of Texas to find the titles and status of the included Enron employees.

More recent use of the corpus has involved research on email formality in the workplace (Peterson, Hohensee, Xia, 2011), and research on email overload (Vacek, 2014) and (McMurtry, 2014). Although the original research made great strides in the organization of the corpus through methods of database structuring, redaction of personal information, cross referencing organizational structures, and the clean-up of duplicate messaging, research related to artifacts and attachments has been limited because these elements were not included in the original structure of William Cohen's corpus provision. As my research intends to focus heavily on the mediating artifacts / attachments contained in email, the cleansed databases readily available for corpus analysis will not be as helpful as originally anticipated. Luckily, a consortium called EDRM, comprised of corporations, business executives, and professionals dedicated to maintaining the standards and best practices of the e-discovery community, has made a version of the Enron Corpus available in .PST file format that contains original attachments. This dataset was made available through research conducted by NUIX to demonstrate their ability to identify and eliminate PII (personal identity information), PHI (personal health information), and PCI (payment card information). The resulting dataset has been cleansed, resulting in the identification and elimination of more than 10,000 emails and attachments (Cassidy and Westwood-Hill, 2010). Eliminations include 60 items containing credit card numbers, 292 items containing birthdates, 532 items containing highly personal information, over 9,000 items containing resumes or other personal contact details. Although a full inventory of removed items is unclear, this data set should be considered more appropriate for work-related analytics since both messaging and attachments of a personal nature have been removed.

2.5 SUMMARY OF KEY CONCEPTS GUIDING RESEARCH TRAJECTORY

The background and literature review highlights some key principles that will need to be addressed throughout my research. First, I will be attempting to find a way to make project work visible for reflection so that the results of the reflection can be shared in a consistent frame across project team members. I have chosen Activity Theory as an orienting framework because of its focus on human development and learning, its proven ability to model and make work visible for reflection, and its ability to maintain the relationship of an activity's details as analysis moves along the individual to community continuum. The sheer complexity involved with project work compounded especially by variations in methods, cultures, and gaps in central project management applications will present many obstacles but highlights the need for better ways to study the discipline. Project artifacts will play a significant role in the activity analysis. Their presence in email offers an empirical repository of communication acts that if modeled adequately can help make past work visible especially across organizational boundaries of work. Achieving a working activity model using email as a source, will require that I overcome many challenges presented by the unstructured nature of email and various personal information management strategies. Given the scope of challenges, I plan to work with one of the only publicly available email datasets, the Enron Corpus to determine how emails features can be leveraged in the development of activity system models. The resulting method to make project work visible by using email will be leveraged in a real-world analysis of project work and compared to more traditional data extraction methods associated with activity system development to determine any advantages it brings to a multi-method approach of work analysis. Lessons learned will be leveraged to inform a technical design meant to empower both project workers and researchers interested in improving project work.

Chapter 3. METHODS

This chapter provides a review of the central methods used to situate my investigation. It begins with a primer of Activity Theory and Engeström's activity system modeling method. The activity system model provides a specific coding frame that organizes and relates key components of extracted data into a meaningful representation of activity. The chapter continues with an overview and justification of both archival research and case studies. Data extraction methods including semi-structured interviews and document analysis are also reviewed. Specific applications of methods will be discussed in association with resulting research presented in future chapters.

3.1 INTRODUCTION

The research and development of new methodologies for workplace analysis is often rooted in qualitative methods that allow for deep explorations, rich interactions with artifacts and individuals, and an in-depth analysis of work procedures. Qualitative research is inherently multi-method in focus in the hopes of securing a rich, in-depth understanding of the phenomenon in question (Denzin & Lincoln, 2005). As a socially oriented researcher attempting to employ qualitative practices in a culture dominated by positivist quantitative frameworks, I attempt to use every tool available to promote a rigorous field of study to incorporate, describe, and at times interpret the complex web of emergent culture and society that is defined through human activity and interactions. Orienting oneself with the proper alignment of methodological and theoretical underpinnings not only helps guide the selection of methods and tools to use on the qualitative quest, but helps ensure that the eventual product of the research can reach its attended audience by meeting the demands of rigor and proper orientation demanded by peer review and publication

standards. "Regardless of the author's professed theoretical or methodological allegiances, articles submitted for publication are evaluated, in part, on the goodness of fit between the epistemological/methodological frameworks authors claim and what they actually deliver" (Loseke & Cahill, 2007 p.493). To orient the goals of my research and ensure that the methods I am planning to use for both data collection and analysis are properly oriented I think it best to offer my philosophical views on conducting research. Hopefully through this process I can identify any inconsistencies with my proposed methods for conducting in-depth interviews (including the types / wording of questions planned) and the resulting analysis of the data and materials collected.

I would classify myself as a constructivist. I am heavily influenced by the work of Vygotsky and Engeström and the use Activity Theory as a scaffolding rubric to study practices of workers and organizations. I believe in the core philosophy of constructivism in that a subject and object of study are in effect constructed through their activities in the world, and that their experienced reality can in effect impact our view of the world as we continually develop. According to Denzin and Lincoln (2005) a constructivist / interpretive mind assumes a relativist ontology (multiple realities), a subjectivist epistemology (knower and respondent co-create understandings), and uses a naturalistic set of methodological procedures (findings are usually presented in terms of the criteria of grounded theory or pattern theories). Terms such as credibility, transferability, dependability, and confirmability replace the usual positivist criteria of internal and external validity, reliability, and objectivity. From a research standpoint, I strongly support the multi-voiced perspective gained through historical interviews and observations and believe that my experiences as a researcher must be addressed in the research (either through its inclusion or purposive exclusion). With this philosophy in mind, I employ several qualitative methods throughout this research to help identify strategies and methods for project work reflection and analysis.

An element of rigor that helps the qualitative process is one of triangulation or using multiple data sources to reach conclusion and consensus on findings. My work begins with archival research aimed at developing a new methodology for structuring email through an activity system lens. I leverage that new methodology through a targeted case study where I compare results to more traditional qualitative data extraction methods including a semi-structured interview and document analysis, all bound by the coding structure afforded through Activity Theory. Rigor is expressed through triangulation of methods and results lending support to the credibility of findings (Devers, 1999 and Shenton, 2004). Transferability and comparability, other key elements to qualitative rigor are supported by providing a rich understanding of the context of analysis and its context. It is important that sufficient thick description of the phenomenon under investigation be provided to allow readers to have a proper understanding of it, thus enabling them to compare the instances of the phenomenon described with those they have seen emerge in their situation (Shenton, 2004). Dependability is accomplished through close detail to method description and providing results in a narrative that instills confidence between the reader and the researcher.

3.2 ENGSTRÖM'S ACTIVITY SYSTEM AND THE ROLE OF CONTRADICTIONS

Activity Theory is uniquely suited to provide insights into project activity because it is holistic in its approach to work systems. The work of Yrjö Engeström (1987) propelled the use of Activity Theory in work-related research by incorporating its underlying concepts into a model representing the mediating aspect of activity as seen in Figure 3.1.

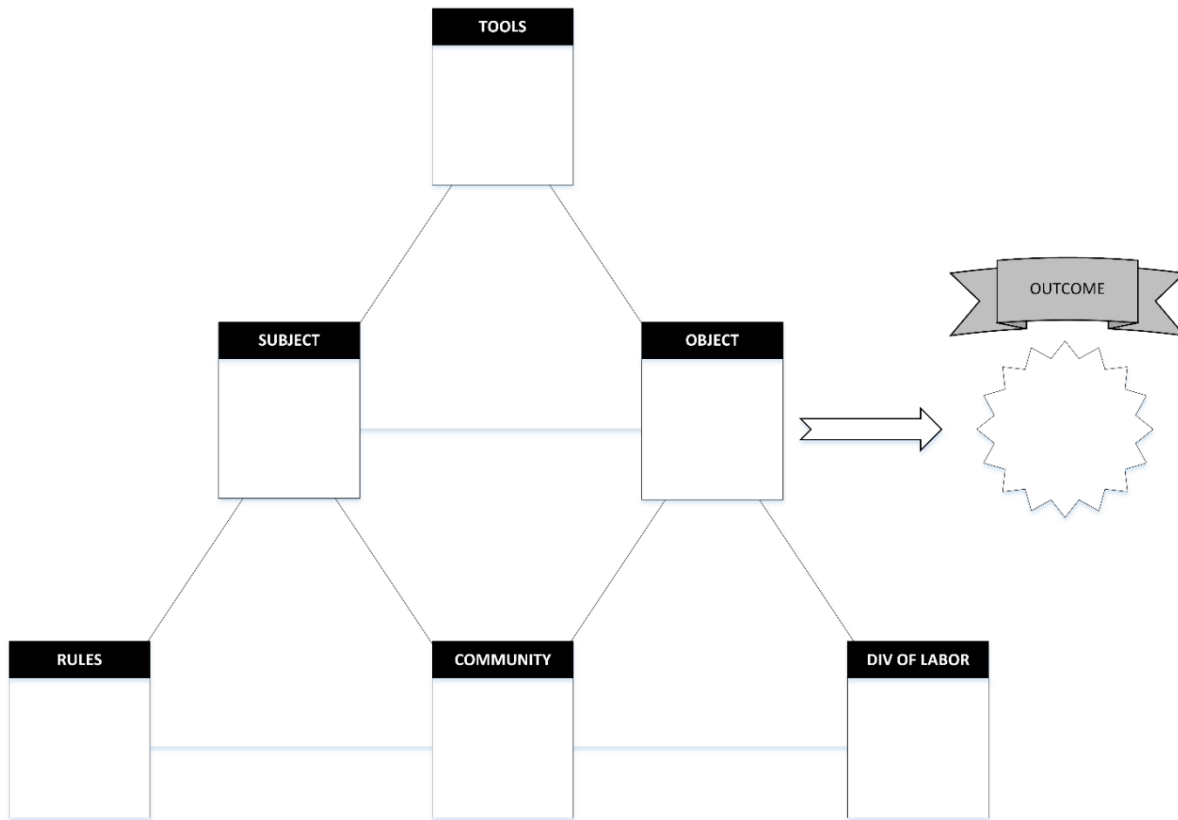


Figure 3.1 Engeström's Model of the Activity System

The activity system model represents the human *subject*, focused on a specific *object* of activity, mediated by any number of *tool(s)* used to achieve a desired *outcome*. As *tools* mediate the relationship between the individual *subject* and the *object* of an activity, *rules* mediate the relationship between the individual *subject* and his or her associated *community*. To complete the concept of the collective, a *division of labor* mediates the relationship between the *community* and the *object* of the activity. When completely envisioned, Engeström referred to this collective view of activity as an “activity system,” the most complete unit of analysis needed to understand activity from a cultural and historical perspective. If a researcher were to use this model as a reflective tool, they might ask the questions outlined in Figure 2 to begin identifying the necessary components of the activity system.

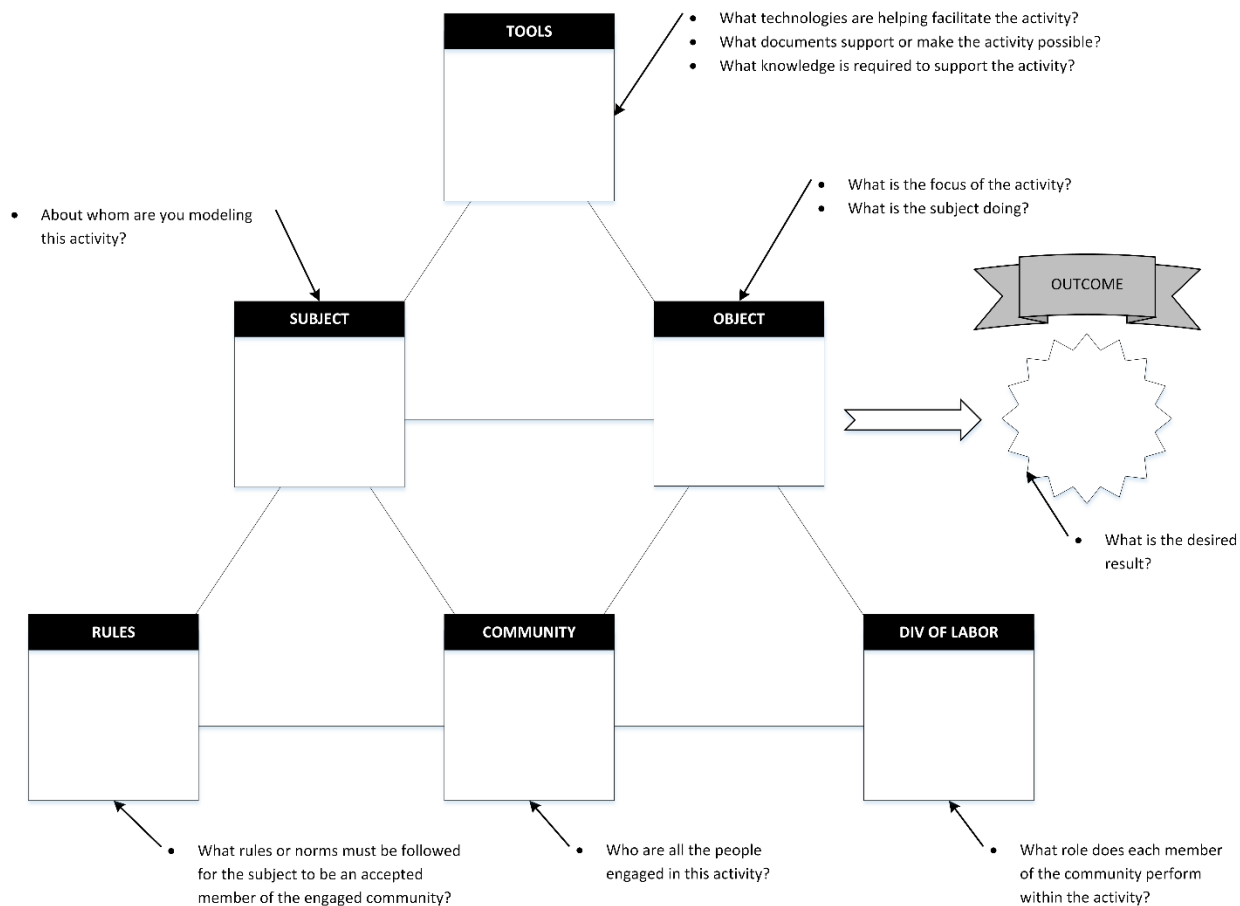


Figure 3.2 Questions Supporting the Modeling of an Activity System

Activity systems and the individuals enacting them, are impacted by contradictions or tensions within and between the nodes of activity. In this sense they are dialectical in nature and are constantly developing in their evolution. Engeström uses his model of an activity system to highlight four levels where contradictions might be identified. A first level, or primary contradiction, occurs between two or more interpretations *within* a given node of the activity system. For example, two separate tools may be used to perform the same action, however they may result in varying degrees of effectiveness in achieving the subject's objective. A secondary contradiction occurs *between* the nodes of the activity system. The subject's decision to use a particular tool, the subject's understanding of the rules that govern a given community, or perhaps

the understanding of the division of labor that structures a community's approach to a given activity are all examples of secondary contradictions. A third level contradiction occurs between the existing form of an activity system and its potential to deliver a more advanced or desired outcome. A fourth level contradiction, which rests outside of the scope of my research, occurs within a network of activity systems, where one activity system and another activity system are in conflict while involved in the production of a joint outcome (Engeström, 2000).

Using Activity Theory to scaffold and organize information in a way that highlights areas of potential contradiction in each activity system provides reflective opportunity to compare empirically derived data against assumptions and expectation. These comparisons have the potential to expose areas of internal contradictions or tensions offering specific mitigation opportunities that might lead to more efficient processes or activity. The activity system model has shown tremendous value in studying work on many levels (Russell, 1997). Spinuzzi (2013) offers an accessible guide to practicing this modeling technique at various levels of knowledge work (micro, meso, and macro) in organizations. My study addresses the unique challenge of using an activity system model to understand work at such levels in project-based organizations. Traditionally, researchers engaged in developmental work research (e.g., Engeström, 2000) have collected artifacts, observed work practices, and interviewed workers to understand systematic networks of routine activities that persist over time. PBOs, by contrast, are defined by fleeting processes and temporary work configurations in which project workers are frequently associated with multiple, irregular project configurations of varying temporal durations. The challenge, then, is how can one observe and begin to understand a PBO using traditional methods if the information collected represents only the set of projects currently in play? What material is sustained across the PBO that can serve as a consistent and stable source for analytic inquiry? A well-reasoned

approach to studying project-based work at a scale that transcends individual episodes of work would need a rich source of data, ideally one that was pervasive, contained current and historical communication among workers, contained distinct mediating artifacts with historical context, and afforded access to motivated members of the organization.

The question becomes, what empirical source of information exists within contemporary work environments that can serve as a consistent and stable source for analytic inquiry into the development of project workers? The source of information would need to be ubiquitous, contain historical communication between project team members despite organizational boundaries, contain distinct mediating artifacts with historical context, and allow unfettered access by the project worker or analytical researcher. Despite the plethora of collaborative tools emerging since the proliferation of internet access, email remains a consistent standard for workplace communication and provides the most obvious source of information for researching project-based activity and worker development. Email in the workplace remains largely under researched as a natural repository of activity system artifacts. If I was able to structure the metadata and artifacts bound in the details of email in a way that represents mediating activity systems, I could compare activity system expectations to structured results and identify primary and secondary contradictions within and between models. Reflecting on these contradictions would then afford the project worker and associated team the ability to learn, adapt, and develop in a more structured work environment.

3.3 ARCHIVAL RESEARCH

As acknowledged in Chapter 2, the structure of email poses many challenges to data extraction and analysis. Analyzing an archival data set of emails provides a perfect testing ground to not only dissect and explore the structural components of email but it also allows for a deep review

of material without the personal limitations often applied in the workplace. Archival research uses existing information not collected directly by the researcher to help answer research questions. It has been used to study statistical records, survey archives, and written records ranging from anthropological reports to computer databases (Cozby, 1992). My archival study centers on a special version of the Enron Corpus, a publicly available source of emails made available by the Federal Energy Regulatory Commission during the investigation of the Houston based company's collapse. The version I use was made available in an MS Outlook .PST file through a consortium called EDRM as their format contains original attachments (Cassidy and Westwood-Hill, 2010) needed to analyze and inform the development of an activity-based solution to visualize traces of project work. This corpus contains over 500,000 emails from 151 users, distributed across 3,500 different folders.

3.4 CASE STUDY

"Case study research is a qualitative approach in which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases), over time, through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audiovisual material, and documents), and reports a case description in case themes." (Creswell, 2007 location2092). Case studies are common in the arena of qualitative investigations. They allow for a deep and focused assessment of a case, and typically call for a descriptive narrative of findings. There are many types of cases. I will be conducting what Stake (2005) calls an instrumental case study, where a case is examined to provide insight into an issue or to redraw generalizations. In this instance, the case plays a supporting role to a larger agenda and typically requires the case to be chosen based on specific criteria that support the larger agenda. Stake (2005 pg.449) claims that the simplest rule for a case study is to "place your best intellect into the thick

of what is going on...brainwork ostensibly is observational, but more critically it is reflective.” To this end, he advises researchers to seek patterns in data to develop issues, triangulate key observations, reflect on alternative interpretations, and develop firm assertions about the case.

My study involves the case of a project worker involved in a multi-organizational design project. I wanted the case to reflect a condition involving the variation of power between collaborating organizations as found in a client and vendor relationship. To help transferability I also wanted the case to include at least one company performing work “offshore”, a common occurrence in modern day technical design projects. The project worker in my case study was referred by a mutual friend. Luckily, the subject had been involved in a project that met my desired study conditions, however the decision to study this particular subject was a sample of convenience. Several candidates were considered, but the actual participant was the only subject able to obtain permission from his company to share sensitive information about work email. This permission came with conditions that required anonymization of all individual and company names.

Maintaining ethical research practices is an important element in any study. Case studies present the opportunity to observe, interpret, discuss, and share information that can be considered highly sensitive and personal. This is especially true when conducting research in the workplace. In order to protect the subject of my case study, all names of individuals and companies were anonymized at the point of data collection and the primary subject of the case was given the opportunity to read and provide any feedback or challenges to the resulting figures and narrative of results, both in terms of identity management and the qualitative interpretation of data.

The case was examined through the lens of Activity Theory. I apply the methodology I developed to use email as a source of empirical analysis for project work. To help compare its effectiveness

as a data extraction method and to triangulate results I will also be using document analysis and a semi-structured interview to extract and model data through an activity system lens.

3.4.1 *Document Analysis*

As highlighted in Chapter 2, documents and artifacts that support project work are of critical importance to my analysis. They are the very tools that fill the gap that project management applications leave behind. They represent organized ways of thinking, genres of information, culture, history, and personal insights. They are critical in mediating social relationships as they are used by people to access knowledge and provide a means by which we can access people (Prior, 2004). Documents in the form of attachments are the operationalized tools in my activity system assessment of email. Documents are often the very object of interest for work research conducted using Activity Theory as a methodological framework (Spinuzzi, 2011). Beyond the individual assessment of documents that are a natural part of my email-based methodology, I look for a central organizing document for analysis when conducting research on projects. Project work often produces a central organizing document during the planning phases of work. Examples include project charters, statements of work, contracts, etc. Analyzing a central project document can reveal incredible insights about a project's original objective, the division of labor, rules of engagement and sequencing, tool selection, and more. Comparing information gleaned from a central project document to other sources used to model activity can highlight key contradictions and tensions between the expected and the experienced.

3.4.2 *Semi-structured Interview*

In Appendix C, I have included a script for a semi-structured interview including a brief introduction, a detailed list of questions with potential follow-up probing / clarifying questions and

exiting comments. Given that the interview is an interactional encounter and that the social dynamics of the interview can shape the nature of the knowledge I attempt to establish a level of openness and comfort with the participant. I evoke a conversational style approach to put the participant at ease, letting them know that their responses are confidential, and that I will consider this work as something that is being conducted in partnership with the participants. It is understood that one can avoid bias by establishing a true research partnership in which the respondent understands that what we need is a full and accurate report (Weiss, 1994). There are no right or wrong answers, as we are both constructing knowledge through the questions and answers. I begin my series of questions with a list of terms that I will use during the interview to make sure that both the participant and I are grounded in a similar context before proceeding. The use of language, particularly the use of specific terms is important in the creation of shared meanings so that both interviewer and respondent understand the contextual nature of specific referents (Fontana & Frey, 2000). According to Fontana and Frey it is also vitally important to note that nonverbal techniques including the use of interpersonal space, the pace of speech, the quality of voice, and body movements and posture also play a crucial part in communication and making sure that the participant is comfortable and willing to engage. These elements are not addressed specifically in the protocol, but their importance is implied. I specifically refrain from asking purely demographic questions in the beginning. Weiss (1994) indicates that it is inadvisable to ask for census style data up front as it sets the wrong tone. If requested, it should be done at the end. I prefer to collect this information directly through a mini-survey upon completion of the interview and the establishment of the participant file. The questions are then oriented to the practice work of the participant with a focus on an open collection of historical, opinionated, and emotional responses that help to illuminate the hidden work and relationships involved in the work. A focus is subtly aimed at the

relationships, artifacts, and a sense of rules and power that is manifested in the reality of the participant. The aim is to obtain a complete participant reality of the environment and work experiences rooted in the past, present, and future. The order of the questions is meant to help illuminate a “macro” representation of the work environment for both the participant and me. The questions then attempt to focus the research from a broad and historical overview to real-time work and products that should produce more visceral responses needed to complete a holistic view of work. Weiss (1994) claims that reports of actual events are ordinarily made in the past tense and that frequent use of the present tense can add immediacy and drama to accounts. Though some questions are made in the past tense, I attempt to use present tense questions in follow-up when possible. The wording of my questions have been formed taking into account potential biases in race, gender, and social status, but I admit that it is only through experience and reactions that I will be able to truly fine tune the wording to offer a considerate and unimposing agenda free from my own biases as a researcher. Again, these elements will iteratively correct over time as I sensitize myself to the questions and attempt to develop rapport with my participants.

3.4.3 *User Study*

The final stage of my research involves the testing of a data transformation protocol for workplace email and a resulting visualization tool. The participant in my user study was a sample of convenience, a known colleague who worked at the same public university where I study and work. The participant was granted permission to participate in the study and I was able to access and transform his workplace email for testing and analysis without the typical concerns of non-disclosure agreements and cross-organizational protections often required in for profit corporate project-based organizations. The participant provided a .PST file for transformation and tested the results in a tableau visualization using question prompts developed during my archival study.

Chapter 4. ARCHIVAL STUDY OF THE EDRM ENRON CORPUS

4.1 OVERVIEW

Engeström's (1987) use of Activity Theory to study long standing work practices lacking a cohesive central control structure was very effective in identifying varying degrees of contradictions within and between activity systems for complex collaborative work in healthcare. His action-based research methodology involved observations, interviews, artifact collection and analysis, and reflective assessments. The activities he examined represented longstanding work practices rich with socially understood roles, chains of command, distinct organizational boundaries, standard artifacts embedded with years of human practice and knowledge. My exploration attempts to find an application for a similar methodology, but one that is altered to focus on project work, where activities are confined to a certain time frame, the community uniquely assembled for a fleeting purpose, and the artifacts left as mere breadcrumbs to help retrace a history of work that is no more. Although the project that served as the central reason for bringing individuals together may dissolve as quickly as it materializes, the individual workers and the supporting organizations that employ those workers remain. A workplace culture begins to emerge over time, but what tools exist to help explore the Project-based Organization and the individual contributing workers that meander between defined work boundaries required by differing project demands? How are temporary work artifacts to be explored in context with temporary work communities? How are project workers employed by a PBO able to distinguish between contributing cultural and social dynamics of their organization or those temporarily expressed through the lifecycle of a project. How does project culture connect to organizational culture? Where does one begin and the other end, or are they mutual transformative? To begin to understand these questions, researchers need to be able to examine

project specific artifacts, project specific team configurations, and activity-based interactions and communications. As outlined in previous chapters I believe that email, serving as a near ubiquitous tool for cross boundary communications and collaboration in the modern workplace, has the potential to offer the reflective material needed to construct activity models for project worker reflection. Through coordinated use of a model that provides a common platform for shared inspection, reflection, and communication, project workers will have the tools necessary to begin identifying specific issues within a project, or systemic issues that may be carrying over from one project to the next because they are perpetuated by the social and cultural configurations of the employing PBO.

In this chapter, I derive and propose an Activity Theory framework to analyze and model email communications generated during a project lifecycle to help identify emerging contradictions and provide reflective feedback loops for project workers. My archival study focuses on project-based work messages in the EDRM Enron email corpus (Klimt and Yang, 2004).

Using the EDRM Enron corpus, I offer an archival study detailing the construction of a reflective, activity-centric model for project workers. I explore the configuration of the corpus through the enabling structure of Microsoft Outlook, a common email client used for work in the US. I explore the affordances and constraints that the structure of email provides when attempting to analyze content and metadata. Through various stages of content analysis, I identify a single individual in the corpus that is clearly involved in multiple projects. Through a process of content framing and isolation I identify a specific project and a specific phase of the project on which to focus my continued analysis. Through my exploration I identify the key components of email that can be leveraged in the production of activity-system models. I continue to explore the rich possibilities for reflection, made possible when the resulting models

are analyzed for contradictions that prevent the project worker from achieving their goals as efficiently as possible. I breakdown each node of the activity model and discuss the opportunities for reflection and learning. My archival study attempts to answer the following questions.

- RQ1 - What components of an individual's email can be used to inform and develop activity system models allowing reflective capability for project work?
- RQ2 - What components of the activity system are left underdeveloped through an analysis of email alone?
- RQ3 - What types of questions develop during the modeling exercise that would assist in the reflection process?
- RQ4 - Finally, what skills would be required on behalf of the analyst conducting this work to develop the reflective models?

By answering these questions throughout the archival study of a publicly available email source, I hope to demonstrate how the development of a reflective activity system model might assist any project worker in the workplace. The modeling of an activity system is typically conducted with the person or *subject* of the activity. Since I was unable to conduct my analysis with the owner of the email folders, I pose, but leave unanswered the questions one might highlight, were the project worker available to reflect on his work enshrined within the corpus. The modeling approach offered through this study could provide UX-focused communication specialists a more formal role in the project management process by identifying areas where they could help project workers improve communication across project documents and the work systems that sustain them. In turn, the reflective assistance provided by UX-focused communication specialists could help project workers identify and confront the socio-cultural contradictions that

may be at play between the work activities experienced within a project and those that may be desired or supported by the larger employing PBO.

I discuss the limitations and challenges with the archival study and make recommendations and plans to move the derived methodology into the field to analyze real-world projects and the organizations that support them. As the Enron corpus is a publicly available dataset, I do not attempt to hide the identity of the *subject* nor is my interpretation of the data meant to make any personal claims about the individuals represented. Although Enron is a notorious example of a failed PBO (McLean and Elkind, 2003), my analysis here is not focused on their devastating failing and downfall. Instead, I use this corpus because it is a rich example of workplace email communication in the research community, but one that has been largely neglected by researchers in our field.

4.2 METHODS

4.2.1 *Preparing the EDRM Enron Corpus for Analysis*

The Enron Corpus, a collection of Enron employee emails made public by the Federal Energy Regulatory Commission during the investigation of the Houston based company's collapse between 2001 and 2002, become becoming a golden standard in research related to email. This corpus contains over 500,000 emails from 151 users, distributed across 3,500 different folders. Klimt and Yang (2004) introduced the corpus in their study on text learning and automatic folder classification, followed shortly by Shetty and Adibi's (2004) research on link, network, and textual analysis. This early work was not interested in actual attachments contained in email and due to size constraints, the attachments were excluded from their analytical databases. A consortium called EDRM, however, offers a version of the Enron Corpus available in .PST file format that contains original attachments (Cassidy and Westwood-Hill, 2010). Using this version

of the corpus, I introduce an archival study of an individual project worker's email and use it to assemble a meso-level activity system model of project work.

4.2.2 *Structuring Email as a Reflective Source for Project Work*

Despite the many collaborative tools emerging since the proliferation of internet access, email remains a consistent standard for workplace communication and provides an obvious source of historical information for researching project-based activity and communication genres. As noted in my background review, Østerlund, Sawyer, and Kazianus (2010) demonstrate that email usage patterns are highly correlated to meeting activities, providing an index of broader patterns of externalized work activities. Other studies provide evidence that email is connected to coordination and project work (Mason and Leek, 2012), a conduit for artifacts used across agile project methods (Kuhrmann, et al., 2013), and a potential resource to understand activity systems of work-based networks (Millen, et al., 2004).

4.2.3 *Identifying the Frame for Project Analytics*

A principled, theory-driven approach to analyzing the artifacts found in email exchanges can productively expose activity-centric structures that support project work and provide a source of reflection for project workers. My approach extends Engeström's familiar activity system model to the distinct nature of work in PBOs. However, this approach requires a principled way of defining and constraining the *object* in project-based work, which is not inherent in the model I am adopting. As has been noted (Spinuzzi, 2011), most AT research uses a lax notion of the *object*, allowing the analysis to drift when applied to activity systems at different scales. The approach I advance here, consequently, draws on a resource often overlooked by project management researchers to address this problem—the Project

Management Body of Knowledge (Rose, 2013). Specifically, my approach advances the notion that for analytical purposes, project management activities must be understood in terms of the discrete process groups (initiating, planning, executing, monitoring, and closing) outlined in the PMBOK.

The PMBOK offers a set of field-recognized practices to project management that structures project work regardless of size, industry, or methodology. This systemic structure in Figure 4.1 below outlines five distinct process groups that include (1) initiating processes, (2) planning processes, (3) executing processes, (4) monitoring & controlling processes, and (5) closing processes. By constraining the *object* of focus for project-based activities to one of the five PMBOK process groups, the socially recognized structure of the PMBOK provides a way for project professionals (assisted by UX-focused communication experts as I describe later) to select the attachments that pertain to each process group. Only emails pertaining to the identified attachments are included in the analytic frame, thus limiting the empirical data to a project, project community, and set of mediating tools used to complete the project processes at hand.

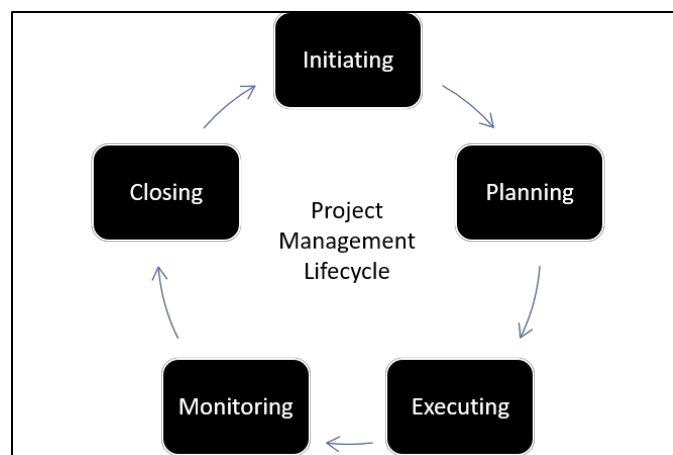


Figure 4.1 PMBOK Defined Process Groups

In addition to the socio-cultural structure offered through the utilization of the PMBOK process groups, I further limit my analysis to an individual subject or project worker. Email is contained in folders organized by individuals, and when analyzed in this way, it offers a specific configuration of communication artifacts unique to the individual. Although I concern myself with providing an approach to assist individual project workers with reflective opportunities, my focus on the individual should not be interpreted as commentary on the longstanding struggle of modeling collective motivations in collaborative work. Although the attempt is not covered in my study, I encourage combining individual activity models for the same object or PMBOK process group, or even across the complete set of PMBOK process groups, so that a greater understanding of the macro-level activity system can be assessed. Figure 4.2 below adapts Spinuzzi's dynamic levels of activity for project work analysis and demonstrates reflective opportunities for evaluation when expanding or contracting the frame for analysis.

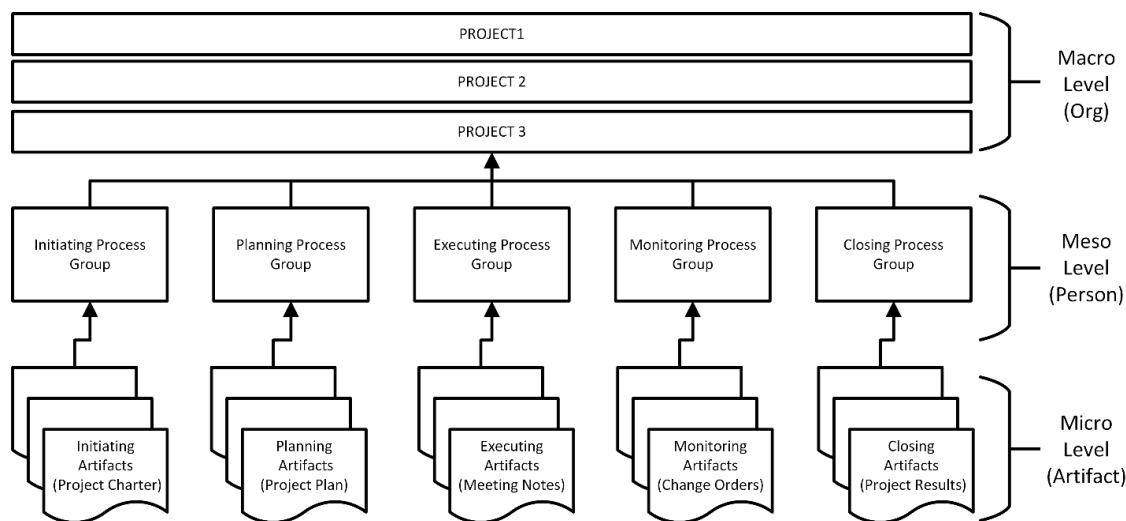


Figure 4.2 Levels of Activity Analysis (Spinuzzi 2013) Adapted for PBOs

4.2.4 *Focusing on the Sent Folder of an Individual Project Worker*

The “sent” folder has been chosen as the area of focus as it naturally implies a direct motivated action on behalf of the sender. The “sent” folder may also help serve as a control for future analysis and reduces disruption caused by folder structuring techniques found to serve PIM desires of the typical email user. This analysis will pay special attention to emails containing attachments (assumed to be mediating artifacts) and their potential impact on the activity-based development of a project worker. Any email in the “sent” folder that does not contain an attachment will be coded as a mediating tool within its own right. This analysis will use activity theory and Engeström’s activity system model as a scaffolding structure to provide insights on how email content and associated attachments are used in conjunction with the contextualizing meta-data (email subject, body, and distribution list) to mediate collaborative work based interactions among project workers. Findings that fall outside of the structural guidance of activity theory will be categorized in the hopes of illuminating inefficiencies and areas for theoretical advancements. I hypothesize that email meta-data, textual content, and associated attachments can be used in the development of an activity-centric profile that can be compared to activity-centric profiles made possible by the translation of traditional project artifacts. The comparison of activity system profiles can make visible potential contradictions in project activities.

4.2.5 *Analysis of Stokley’s Sent Email Related to Project Ranger*

Although email possesses defined components such as the body, the subject line, distribution requirements, and time stamping, it remains extremely unstructured for data analytics, especially when attempting to include attachments in the analysis. To help facilitate my investigation, *Stokley’s* email folders were rendered in Microsoft Outlook and .PST files for each folder were

converted to Microsoft Excel. Each email was downloaded as a row of data with each of its components detailed in columns. Each email attachment was saved into an ordered folder structure on a server and linked directly with its message contained in the MS Excel file. Each attachment was opened, reviewed, and coded as belonging to one of the five PMBOK process groups. This coding was based on adherence to communication genres that address the goals outlined for each PMBOK process group. The assessment and selection of project artifacts is the most important part of determining which emails should be included in the analytic frame. Although the owner of the email would be able to provide definitive answers on what artifacts should be included, the selection process offers a unique space for researchers to facilitate review of communication genres in project work and develop questions related to their importance, structure, and role within the overall activity system. Notes were taken to describe the function of each attachment and to indicate any information that may identify its association to a project. The *Stokley* data set represents messages between the dates of March 30, 2001 and October 25, 2001 and contains 21 folders including 1,340 emails with 633 unique attachments as detailed in Table 4.1.

Table 4.1 Stokley Email Folders and Attachment Counts by Folder

Stokley Email Folders	Attachments								Messages
	Excel	Word	Text	PDF	PPT	Image	Other	Total	
Enron Corp	0	1	0	0	0	0	0	1	19
ISO Client Rep	49	19	1	7	1	3	0	80	45
ISO INFO	1	8	0	0	0	0	0	9	29
ISO MRKT INFO	13	35	0	11	0	1	0	60	128
Mid Markt	4	0	0	0	0	1	0	5	34
Murray	6	17	0	0	5	0	3	31	76
Projects EES	0	2	0	0	0	2	0	4	4
Projects EES Banding	4	3	0	0	1	0	0	8	14
Projects EES Banding KPMG	7	10	1	1	5	0	1	25	40
Projects EES Brenda Herod	0	0	0	0	0	0	0	0	6
Projects EES Ercot	1	11	0	0	0	0	0	12	12
Projects EES INFO	3	4	0	0	3	0	0	10	15
Projects EES Intr-Month Book	1	0	0	0	0	0	0	1	5
Projects EES IT	0	0	0	0	0	0	0	0	7
Projects EES Metering & Forecasting	8	7	0	0	1	1	2	19	29
Projects EES Neil B	6	1	0	0	0	1	0	8	19
Projects EES Todd Busby	3	3	0	0	0	0	0	6	5
Projects SQMD	1	9	0	0	2	0	0	12	35
Regulatory	2	1	0	1	0	0	0	4	13
Volume Mang	35	28	1	2	0	1	4	71	235
SENT	201	44	2	2	9	5	4	267	570
	345	203	5	24	27	15	14	633	1340

In *Stokley's* absence, I looked for empirical clues within the corpus to help focus my investigation to a specific project. Again, this highlights the need for skills possessed by a UX researcher. Although a subject may select certain artifacts to be included in the analysis, a review of the project communication genres by a UX researcher can offer the subject greater insights into the structure and role of their artifacts in ways that may be lost to the subject due to familiarity and routine. The use of these artifacts can reside at a subconscious level of operation, and not until questioned will the subject be encouraged to reflect on the artifact to determine if it is in fact facilitating the work that they would expect it to. A single MS Excel document named

“EES Activity Listing 071201.xls” provided a high-level monitoring document that outlined a comprehensive task list by project. This document revealed that the Enron Energy Services (EES) organization had five distinct projects running in parallel during the period represented by *Stokley’s* email. These projects included Phoenix, Gas Solutions, Ranger, Genysis, and Power Solution. Given the prevalence of the attachments available, I narrowed my investigative focus to 73 unique emails associated with 19 distinct attachments coded as belonging to the *planning* process group of the “Ranger” project. This project governed the development of a data warehousing initiative and involved project coordination across the Enron entity and external partners CSC and KPMG.

4.3 FINDINGS

4.3.1 *A Meso-level Focus on the Planning Process Group of the “Ranger” Project*

A review of the 19 identified documents and their 73 associated emails provides the basis for deriving an activity system model for the *planning* process group of the “Ranger” project. The activity system model, as shown in Figure 4, opens the possibility for reflection. Each component of the model is discussed, and questions are posed based on reflections raised. Since I was unable to conduct my analysis with *Stokley*, I aimed merely to document questions one might highlight were he available to reflect on his work enshrined within the corpus.

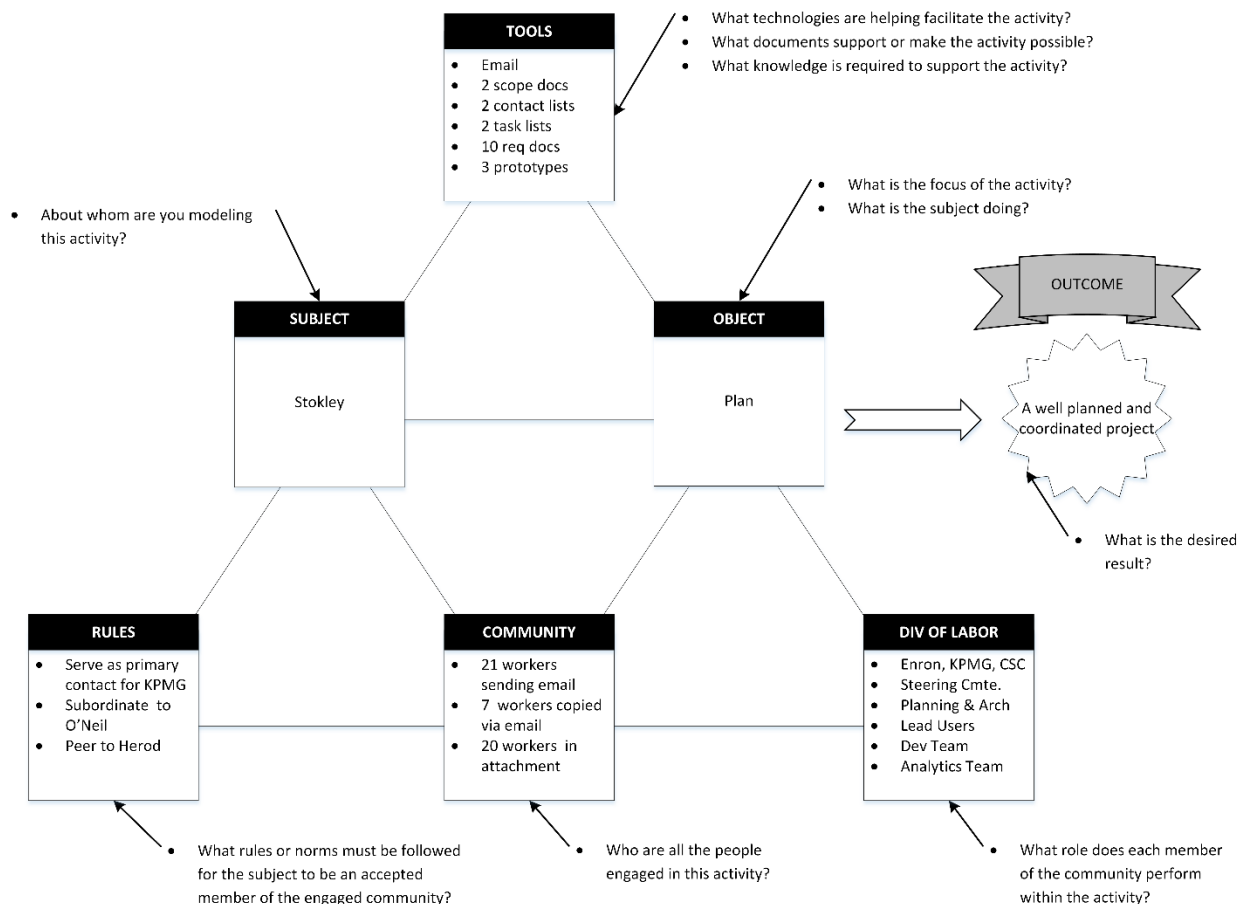


Figure 4.3 Ranger Project – Planning Process Group Activity System

4.3.2 The Subject (Stokley)

As stated in my overview of Activity Theory, I hold the human *subject* of the activity system to a single individual. The effort to model the project-based activity system using an individual's unique collection of email exposes a project worker to an empirical frame against which they can reflect, learn, and grow. My articulation of the *planning* processes for project "Ranger" is based on information available only through the email folders owned by Enron's *Stokley*. In this way, my archival study mimics the kind of workplace email analysis that could be facilitated by a UX-focused communication researcher and conducted for any individual project worker in a PBO.

4.3.3 *The Object (Planning Process Group – “Ranger” Project)*

As previously outlined, my focus on the project activity system begins with the selection of one of the five PMBOK process groups so that I can identify and focus on the mediating attachments at play. By focusing on a specific process group, a project worker can compartmentalize their analysis to individual stages of the project lifecycle and identify specific attachments or project work genres of communication that might warrant a deeper level of activity-based analysis. I focused on the *planning* process group to identify early stage artifacts used across this multi-organization initiative.

4.3.4 *The Mediating Tools (Email Attachments)*

I identified 19 attachments related to the “Ranger” project when focusing on the planning process group. The attachments included two variations on scoping documents, two variations on contact lists, two variations on task lists, ten requirement documents, and three prototype documents. An initial reflection might ask whether this list of documents feels complete for the *planning* processes of the project. What documents seem to be missing? What planning documents might be shared across other process groups? Why might *Stokley* not have received certain planning documents through email when he knows that they must exist? What might this say about how the project community at large is informed about the planning of the project? What opportunities might this information provide to improve communication?

A cursory view of the attachments immediately surfaces potential primary contradictions that might emerge in their use during the *planning* processes of the “Ranger” project. Primary contradictions occur within a node of an activity system (Engeström, 2000). For example, the two scoping documents provide different levels of details surrounding the same project. One scoping document is a robust MS PowerPoint detailing the project goals, the project

membership, the project timeline, and major milestones. This attachment was created by a member of Enron and forwarded to a member of the KPMG team. The KPMG team member then forwarded this artifact to *Stokley*. Another scoping document, simply designed in MS Word, offered a similar goal and timeline with different project membership, and different tasks. This scoping document was shared with *Stokley* by an Enron employee named *Frasier* and was contextualized with email content that indicated the scope of the project had been altered significantly since inception. These two scoping documents, although centering expectations around a larger community, had very little overlap in observed distribution channels according to the evidence available in *Stokley's* email. In this example, it is possible to begin to see the learning power available in the contradictions that emerge across mediating tools. Was the entire project membership changed abruptly? Were the variations purposeful and meant to communicate different aspects to differing parts of the organization? Do these conflicting documents highlight any realized communication gaps in the communal understanding of the project? Did these variations cause issues in the project? How might one control for this type of communication in future projects? This is the very detail that becomes rich for analysis as project-based attachments are considered in their mediating impacts across a given activity system. Not every attachment involved in an activity system may find its way into the analytical frame. The goal is not to offer definitive documentation of everything that occurred. It is merely to provide an informative view of the possibilities of contradiction that might have been introduced within the activity, leading to a greater understanding of the activity system in general.

4.3.5 *The Community*

Using the collected attachments as a starting point, a researcher can identify the contributing individuals who form the project *community*. By triangulating the attachments, the subject lines of the email messages carrying the attachments, and the dates of the emails, a group of individuals who have either participated directly or been copied on the email threads can be identified. Using the 19 unique attachments as a starting point, 73 unique emails were identified as pertaining to the conversation surrounding the artifacts. From this email list, 21 unique individuals initiated emails and 7 unique individuals were copied on emails but never directly contributed. In addition to the individuals participating in the exchange of emails related to the planning processes of the “Ranger” project, a review of the obtained attachments surfaces an additional 20 project workers who do not appear in the distribution lists of the analyzed emails. Together, the identified project *community* appears to consist of 48 unique project workers. Again, this data is likely not a definitive list of the exact membership of the project during this group of processes but it does surface empirical details for project workers so they can learn by finding contradictions in their mental model of the project *community*. Engeström (2000) classifies contradictions between an observed activity system and an ideal activity system as third level or tertiary contradictions. Who was included in the email *community* that was unexpected? What might this tell you about the exposure of certain project artifacts? Were any known members of the project *community* excluded from email communications when important artifacts were circulated? On purpose? On accident? What impacts did these inclusions or exclusions have on the project *community*? This information could have, for example, broadened *Stokley’s* understanding of the breadth of the *community*, highlighted his position

within the *community*, or indicated a need to broaden or condense communication strategies to reach a more targeted *community*.

4.3.6 *The Mediating Division of Labor*

Upon analysis of the collected attachments and their associated email distribution lists it becomes clear that several communities of practice were at play within the planning process of the “Ranger” project. Three primary organizations (Enron, CSC, and KPMG) emerged as distinct entities based on the email distributions alone. That list broadened to include IBM, Avista, and Faser when the actual attachments were reviewed for project membership. Outside of these formal organizational boundaries, attachments also provide insights into a more nuanced organization of labor across the project. One attachment provides a team diagram hierarchy that references lead users and those serving on a steering committee, a planning and architecture team, a development team, and an analytics and verification team. These project divisions included members from CSC and Enron; however, KPMG project workers were not mentioned in this documented structure. Another attachment provides a responsibility structure that calls out a core team, extended team, and management sponsors with associate roles for things like reporting, analytics, IT, invoicing, and information coordination. Once the *community* is brought into the analytic frame, a project worker can begin dissecting how each individual member of that *community* mediates the work and tasks, again comparing empirical evidence against assumed mental models to identify third level contradictions. Were members of the project *community* adhering to their roles? Were they overstepping their bounds and potentially interfering in the work of others? It would not be uncommon for a project worker to find examples of an individual performing tasks outside of the expected *division of labor*, or conversely failing to perform on expected tasks. Actual findings like these, where there is tension

between a community member not adhering to an assigned role of labor would be considered a secondary contradiction according to Engstrom (2000). These examples of contradictions enable a project worker to question, grow and directly alter the future trajectory of their project engagement.

4.3.7 *The Mediating Rules (Power and Boundaries)*

I have shown how the *division of labor* mediates a *community*'s effort within an activity, but attention must also be paid to the *rules* that mediate a project worker's relationship with their *community*. Understanding the *rules* of power, *rules* of communication, and the limitations or availability afforded individuals throughout the *community* is important to determine the *subject*'s ability to affect the desired outcome of the activity. *Rules* are rarely explicit, especially when using email to derive historical remnants of the activity system. Using a combination of language and tone found in the body of emails, as well as indications derived from the frequency of emails, one can interpret certain social *rules* or norms mediating the relationship between the *subject* and the *community*. Relaxed grammar, use of slang, and informal phrasing might indicate that the *subject* is more familiar or tightly bonded with the *community*. More formal, carefully worded emails might indicate the *subject* is adhering to *rules* defining positions of power or subordination. Reviewing the content of several emails, patterns of communication suggest that *Stokley* maintains a subordinate role within the project to an individual named *O'Neil*. More informal communication interactions with an employee named *Herod* suggests a peer-like relationship. It remains difficult to ascertain *Stokley*'s relationship with *community* members from the CSC organization found in attachments, as no emails were exchanged within the frame of analysis. Email frequency, or the number of emails shared between individuals, can also highlight potential *rules* that mediate relationships with the *community*. For example, the

large number of emails sent to *Stokley* from KPMG employees suggests *Stokley* could be the primary contact for the external company when communicating about planning documents. This is seen most notably through the number of emails sent by a KPMG representative named *Galvan*. If *Stokley* were available for reflection, one might consider asking questions about his relationship with the *community* at large. How do various social *rules* mediate interactions and communication between companies involved in the project? How is he expected to communicate across company divisions? How are other companies expected to communicate with him? Who is the client and who is the provider? Whom must he keep informed? Whom does he protect? Who protects him? What violations would jeopardize his standing within the multi-company *community*? How might a violation of these norms and *rules* by a member of the community lead to secondary contradictions that affect the progress of the project?

4.3.8 *A Micro-level Focus on Specific Attachments*

Once a meso-level view of the activity system model is established for a given PMBOK process group, the project worker and UX researcher can dig even further into the specific impacts a single tool or attachment might be having on the project system. This can become especially important for UX communication specialists intending to improve the impact of a given document across the communication system. By placing a specific email attachment as the *object* of an activity system, one can use the same modeling techniques described above to uncover potential contradictions in the development of the specific document. In our field, researchers have produced many instructive examples demonstrating how Activity Theory can support this type of micro-level analysis of texts and the work they do (e.g., Winsor, 2007; Bracewell & Witte, 2003, Russell, 1997). Such micro-level analysis of individual texts and the

activities they support falls outside my meso-level focus on activity systems in project work, but remains a valuable tool, nonetheless.

4.4 DISCUSSION

My archival study demonstrates the underlying potential that email can provide in the development of reflective tools for project workers. It also highlights the emergence of a research role for UX communication specialists within project work. By focusing specifically on a collection of email attachments that mediate one of the five PMBOK process groups in the project lifecycle, it is possible to use contextual, temporal, and distributive qualities of email to derive an activity system model rich with learning potential. Once established, project workers can compare their derived activity system against personal mental models, established charters, or similar models created by project team members, with the purpose of identifying key contradictions that pave the path to a greater understanding of their work and their *community*. With the richness of information uncovered at a meso-level of activity, the same modeling methodology can be applied to specific *objects* or email attachments that contribute to the overall project process group.

Returning to the series of questions I offered at the outset of my study, I now review my findings by modeling my methods. Through this review, I also highlight the skills required to conduct the modeling exercise. I end with a discussion of the limitations encountered through my case study and reflections on ethical considerations.

4.4.1 *Review of the AT Modeling Method from the Researcher's Perspective*

Employing the tools and techniques in my study, researchers would I believe, be equipped to support project workers in their efforts to reflect and become more efficient in the way they

conduct project related activities. Although my case study utilized an archival set of data in the absence of its owner, the methods outlined, and questions surfaced could be used by most project professionals today. By following the suggested guidelines in Table 4.2, a UX-focused communication specialist conducting research could construct reflective activity system models for any project worker regardless of the type of project work assessed.

Table 4.2 Method Matrix for Model Construction

ACTIONS	MODEL COMPONENT
1. Identify the person you would like to assist with an activity-centric reflective model	Subject
2. Identify the project of interest to that person	
3. Identify the date range of the project of interest	
4. Collect emails containing attachments that fall within the identified date range	
5. Identify the project phase of interest (initiating, planning, executing, monitoring, closing)	Object
a. Identify the attachments in the collected array that pertain to the project phase of interest	Tools
b. Identify the project community derived from email distribution lists and attachments	Community
c. Identify rules mediating the relationship between the person you are assisting and community	Rules
d. Identify the role / responsibility of each community member exposed for the project phase	Division of Labor
e. Identify the desired outcome for the project phase	Outcome
6. Identify a single document / attachment from the macro level collection	Object
a. Identify the internal / external tools used to create this document	Tools
b. Identify the project community derived from email distribution lists and attachments	Community
c. Identify rules mediating the relationship between the person you are assisting and community	Rules
d. Identify the role / responsibility of each community member exposed for the project phase	Division of Labor
e. Identify the desired outcome associated with the use of this document	Outcome

A researcher would simply need to identify a project worker (*subject*) interested in the reflection exercise. Together they would select a specific project and determine the period during which the project took place. The researcher would then collect emails sent or received by the *subject* during the identified period using the time stamp afforded each email. From the prepared dataset, the researcher would present a list of attachments and ask the *subject* to help determine which

attachments were associated with each of the five PMBOK process groups. Any attachments of a personal nature, or those not pertaining to the project of focus should be dismissed. The researcher may find that certain attachments could logically fit in more than one PMBOK process group. This would require skills in rhetorical analysis and the evaluation of project communication genres to help the subject reflect and determine the most appropriate process group to be assigned based on the communication context carried with the attachment. With this information, the entire project frame is available for assessment. The next step is to determine the PMBOK process group (initiating, planning, executing, monitoring & controlling, and closing) that the *subject* would like to focus on, and use that as the *object* to derive the construction of the meso-level activity system model. Once selected, only the attachments coded for that process group, and any associated email threads pertaining to those attachments should be isolated for further evaluation. With this dataset, a researcher could assist in the reflective process of deriving the activity system model. Each identified component should be discussed, and the results written down inside the conceptual activity model boxes (see figure 1). The *community* can be identified by piecing together references to individuals found in the distribution lists of the emails (To, From, CC, BCC) and any references to individuals made within the content of the emails and attachments. *Rules* that mediate the *subject's* relationship with the exposed *community* can be derived by analyzing frequency of the emails between the *subject* and other members of the *community* coupled with examinations of communication formality represented in the body of the emails. The *division of labor* that mediates the *community's* role within the activity, can be assessed by evaluating the roles of the individuals emailing attachments (*tools*) during the defined PMBOK process period. The *rules* and *division of labor* components are difficult to model from email directly. These components require some

reflection and *subject* interviews to tease out the final data to be modeled. This should not raise concern because the whole point of the modeling exercise is to promote reflection and learning. As each component of the activity model is derived, reflective questions should be posed to the *subject* to determine applicability. Through this “feedback loop” of model development, the *subject* will have the opportunity to reflect, and increase their understanding of the systemic nuances that facilitate the project work. They can compare empirical evidence of project work to their personal expectations and understanding of the work system and begin identifying specific contradictions to improve for future work. It is very likely that specific documents will surface as holding key influence over certain project processes. Robust distribution lists or multiple versions of an attachment existing throughout the analytical frame are great indicators of the importance a document carries throughout the project. These documents might suggest that a researcher and their *subject* model a micro-level activity system, where that specific document becomes the *object* of analysis. Understanding how key project documents are created and used provides specific opportunities for the researcher to help the *subject* improve project impacts. These activity system models can be used for personal growth or can be leveraged across the project *community* as evidence for improvements to be shared in retrospectives or project postmortems.

Using this approach, a UX-focused communication researcher would have the means to engage in a rhetorical analysis of the project work in which they are embedded. They would have had the means to understand the situated impact of project management documents (*tools*) and an understanding of the networked nuances of collaborative projects. She could help specific project workers think more broadly about the true membership of the project *community* and reflect on the ways that communication flow impacts shared understanding. She could help point out

specific social norms and power positions (*rules*) that might be affecting access to information, and she could help identify specific instances when members of the *community* seem to be stepping out of bounds and violating expectations of the *division of labor*. All this empirical information helps provide concrete examples from the project work system that can be modeled, assessed, and improved. Although my case study and examples have centered on a post project methodology, this type of analysis also provides potential to correct the project work system while in process. After all, it would be better to identify system issues during a project instead of focusing on them once the project is complete. Although post project analysis offers many opportunities for growth and learning, there is no guarantee that all the lessons learned on one project will specifically apply to future configurations of project work. The modeling effort, however, will likely expose organizational nuances that affect many if not all the projects across the PBO.

4.4.2 *Limitations to the Modeling Methodology*

The data structure of email is itself a limitation, as anyone who has worked with it analytically can attest. The unstructured aspect of the archived material limits the span of analysis, especially when attempting to incorporate attachments. Individual folder structuring techniques, message threading, length of body content, attachment naming conventions, and attachment versioning are just a few of the issues a researcher must conquer when attempting to work with email data analytically. Until a tool exists to help flatten and organize this data in ways that make it more scalable for analytics, using this modeling approach to consider activities across larger project communities will be challenging.

Gaining access to other individual's email could provide an obvious limitation where privacy is a concern. Although workplace email should be related to business, common practice would

suggest that it remains a collage of personal and professional communications. Privacy concerns would need to be addressed within each organization. This could be somewhat mitigated if the UX researcher was a trusted role with special access. This would be similar to many IT and public records professionals working across organizations today. Working alongside the email's owner and having them remove messages and content of a personal nature prior to modeling could help in mitigating privacy concerns.

4.4.3 *Ethical Considerations*

My suggested approach for using email to develop activity-centric models for project reflection is not without concerns. First, I want to be mindful of the socio-technical aspects of this type of work. Although it is not my intention, I am fully aware that as email data becomes increasingly mined for project-based insights, project worker use of this workplace resource could evolve for better or worse. Second, I understand that email provides only one source for residual artifacts and communications created across the project lifecycle. Additional sources should be leveraged in addition to email with the intent of deriving a more complex understanding of the project activity landscape. I suggest email as a tool for initiating the analysis because of its empirical archival nature and for its ability to carry content and artifacts across the rather complex and often invisible boundaries of project work. There is nothing wrong with expanding the analysis beyond email once the empirical frame has been established.

Supporting reflection among project workers may also facilitate thinking about ethics in practice. For example, seeing contradictions in work certainly opens speculation about *why* things are and *how* they should be. Beyond this, the model forces consideration of *subjects* and their *object* orientations as well as their means of acting. These considerations are the basis for thinking about ethics of individuals and the ways they choose to act. Given the questionable and

even illegal actions associated with Enron before it dissolved, more informed views of project work might have facilitated broader awareness of how project activities were aggregating contradictions that deserved greater scrutiny.

4.5 CONCLUSION AND FUTURE WORK

4.5.1 *Expanding the Role of the UX Researcher in Project Work*

UX communication specialists have a vital and important role to play in both the successful derivation and deployment of the reflective modeling I propose for project workers. The UX-focused communication community could help solve the technical and analytical challenges posed by robust communication engines like email. They would also provide much needed guidance and expertise as project workers tackle their activity-based contradictions and learn how to effectively incorporate their newfound knowledge back into the project lifecycle and the socio-cultural fabric of their PBO.

Given the known complexities involved with working through an activity-centric analysis, especially in areas of collective motivations and distributed work, I hope that this work will renew conversations and engagement with activity theory in pedagogical curriculums, especially those related to project management. Activity theory's ability to highlight the role of mediating tools or communication genres (project documents) within the situated context of project activities offers educators a tangible tool to demonstrate the power a single communication artifact can carry across an entire work system. With its focus on human development and learning, it highlights personal and social contexts that can constrain and support project work. It helps provide a common language to discuss emerging insights to project work and reinforces social awareness of work systems in general.

With the increasing projectification of work in today's economy, I contend that it is important for organizations to broaden the feedback loops in such work beyond traditional postmortems and retrospectives. UX communication specialists, trained to engage in holistic analysis of project work and able to surface related elements of cultural context as recommended above, will be better equipped to meet this challenge.

UX-focused communication specialists can play a significant role in helping facilitate both research and action-based results in the PBO domain. The role of UX-focused communication specialists in project-based work has been a concern for the field for many years, ranging from studies of how to manage teams of communicators (Bosley, 1991) to integrating UX-focused communication skills into new forms of *ad hoc* project teams (Spinuzzi, 2014). Reflecting the changing nature of work today, leaders in our field (e.g., Fisher & Bennion, 2005) have called for greater integration of UX-focused communication specialists in project-based work. They have called for UX-focused communication specialists to invent and enact appropriate means of assessing how they can become more effective in reflecting on and assessing work practices to support informed collaborative environments.

To prepare emerging UX-focused communication specialists for the projectification of the workplace, pedagogically focused researchers have developed curricular approaches that highlight the synergies of project management and UX-focused communication. One suggested curriculum outlines a communication approach to project management that focuses on genres of project documentation and the situated nature of those documents in the project management process (Kampf, 2006). Teaching UX-focused communication students project management processes and structures better prepares them to understand rhetorical situations in the workplace and participate more effectively in project work with an awareness of the situated role of project

documents. Building on this notion, Lauren & Schreiber (2017) propose a curriculum that promotes a systems approach to project management pedagogy. The authors posit that a systems approach helps those engaged in PM activities understand how project work connects people across organizations. One focus of this approach relies on feedback loops. “Feedback loops are markers or measurements used to determine if a system is functioning well. For example, if a team begins to bypass a newly implemented information communication technology meant to support project work in lieu of the previously used system, the team is clearly signaling some sort of problem. Looking to feedback loops can help project managers understand how well the system is working, and if it isn’t working, make changes” (Lauren & Schreiber, 2017 Pg. 3).

Across both proposed curriculums, project management practices would benefit from students skilled in rhetorical analysis, the situated impact of project management documents, and an understanding of the networked nuances of collaborative projects. My work supports such curriculums and proposes both a role and a recommended approach for UX-focused communication specialists to engage in industry-based project work systems. I propose that UX-focused communication specialists can aid in the development and use of reflective models based in Activity Theory to uncover the empirical evidence needed to support both the communication and systems approaches to project management. Activity Theory highlights areas of contradictions within an activity system, allowing reflective and educational opportunities (feedback loops). It also emphasizes the role of mediating tools or communication genres (project documents) within the situated context of project activities. Most importantly, it helps illuminate the socio-cultural environment through which the activity is being mediated by calling out certain rules and divisions of labor unique to the context of the activity.

4.5.2 *Reflections to Support Future Research*

By coding a project worker's emailed attachments as belonging to one of the five process groups (initiating, planning, executing, monitoring, and closing) outlined in the Project Management Body of Knowledge (PMBOK), we were able to identify associated email threads and use affordances from those emails (dates, distribution data, subject lines, and email content) to piece together an activity-centric model of project work. The PMBOK provides project professionals with best practices in project management regardless of industry or preferred methodology. It offers a socially recognizable structure to the project management lifecycle making it an ideal source for standardizing categories for project activities. I demonstrated that when emailed artifacts are identified, isolated, and grouped by one of the objects of activity (process groups) outlined in the PMBOK, the attributes of the email threads associated with the attachments provided empirical content for a project-based activity model. The resulting model allowed us to identify several key contradictions that could have caused miscommunications among the Enron project community. A table of noted contradictions discussed in this chapter can be found in Appendix F.

Reflecting on the modeling approach developed during my archival study, I have identified three considerations for researchers seeking to model active project work in a PBO. First, the unstructured nature of email poses a series of challenges for analysis. Structuring the data in a format that allows systematic manipulation and comparison of the component parts of email requires significant work. Identification and processing of folder structures, spam, duplicate emails, message threading, attachment versioning, and embedded links, are key structural challenges for an analyst attempting to normalize email data. I hypothesize that the efforts required to manually prepare email data for analysis will prove a significant barrier to adoption in the

workplace and that automating the transformation of email data into a format allowing immediate and efficient navigation of large datasets will be critical to time-consuming analytical tasks.

Second, the process of isolating project attachments within email and organizing them according to PMBOK process groups is difficult. In lieu of other organizing structures, the analyst must review and code all attachments to determine whether they fit within a socially recognized project structure. Organizing the attachments according to the PMBOK process groups is helpful, but I think that modern PBOs will likely use additional tools to manage and store project artifacts. To transition my method from the analysis of an archival dataset to one focused on the dynamic data flows in an active workplace environment, I hypothesize that modern project communication tools (i.e. Dropbox, MS SharePoint, Basecamp, Jira, etc.), could be used as structural starting points for identifying attachments already organized by a project structure. Leveraging a list of artifacts that are already organized by project, in a manner understood by the project professionals themselves, I anticipate will restructure the analytic frame to include only emails associated with attachments that match the structured source. Using a secondary structure external to email itself (e.g., project management or sharing tools such as those listed above) will provide a set of documents that could then be isolated based on document name within the email folders, and the same modeling methodology used to derive the activity-centric model could be used.

Finally, post hoc archival studies most often do not include the subject or owner of the email folders as an informant in the analysis. I anticipate that working with an involved informant will enable deeper assessment and informed comparisons so that those involved in the project-based work can benefit from my activity-centric modeling technique. To truly understand the benefits and potential of the modeling technique, it will be critical to work with project professionals actively engaged in project work to determine whether derived activity-centric models offer the

reflective assistance required to make improvements in active projects. I need to develop a greater understanding of the impacts that newer technologies and agile project management methodologies have had on the way email is used to communicate across project teams. In addition, I would like to know how scalable the activity-centric models can be in helping to identify and communicate consistent cultural contradictions that might be found across projects in the PBO. All these findings necessitate a rich in situ investigation of modern PBOs. Moving beyond this archival study, I seek to explore the potential for such modeling in the current work of PBO professionals. In a targeted case study that involves multiple organizations collaborating on a design project I apply several data extraction techniques to develop associated activity systems. Creating an activity system based on a semi-structured interview, another based on a document analysis, and a third based on my newly developed method for modeling email through activity systems, I compare and contrast the resulting models to identify key contradictions and tensions between them. I also use the comparison to determine the types of insights my email-based methodology generates compared to more traditional methods. The results of the case study will be used to determine its reflective potential with an active project worker and will inform the design of a data transformation protocol capable of visualizing project work distributed through email.

Chapter 5. CASE STUDY: THE EXECUTION OF PROJECTWEB

5.1 OVERVIEW

Using email and attachments generated through existing forms of workflow communication, I anticipate being able to reproduce activity-centric models using techniques I have previously demonstrated to have value in post hoc, archival analysis. These new models will be developed using current data sources and will be further used to support reflection among active project workers. When structured successfully through the scaffolding of an activity system, my model-based information could be used by project workers to compare their structural expectations to project deliverables. Such activity-centric models, ideally, will help expose how group members use mediating artifacts to achieve project-based objectives, promote inclusion within the project communities, and articulate a desired division of labor. As I have previously demonstrated, focusing on email and attachments using the modeling technique I have developed, can offer contextualizing meta-data that characterizes project documents and their mediating potential as boundary objects in the realm of project work. I now anticipate that comparing activity-centric models to more traditional representations of activity structures, like project charters and agile sprint stories, will make it possible to highlight potential contradictions in individual and team-based understandings of project contributions. Such empirically grounded reflection, I believe, will allow individual project workers to become more empowered to articulate their contributions to projects and identify areas where improvement and personal development in the workplace is possible.

The activity-centric model allows researchers to communicate key components of an activity system. These components include the subject or person engaged in the activity, the tools used to meet the objective of the activity, the community involved in the activity, the social rules that

guide the activity, and a division of labor that details the role each member of the community contributes to the activity. Although this analytical approach has been successful in modeling organizational activities associated with persistent and routine work structures like those found in healthcare (Engeström, 1987) it has not been deployed in a manner that addresses the episodic and hidden activities within PBOs. In these organizations, it is not possible to observe workplace projects currently in process and assume that they fully represent the larger PBO. Given that each individual project is an activity system with its own temporary configuration of tools, objectives, rules, community, and divisions of labor, the more projects that can be assessed, the greater the ability to highlight emerging inefficiencies and contradictions resulting from the cultural historical persistence of the PBO itself.

To continue my assessment of the activity-centric method developed in Chapter 4, I move my work into the modern workplace and assess its practical application in a real work setting with practicing project professionals. In this phase of work, I seek answers to the following research questions.

- RQ5 – Is the data derived from email capable of generating an activity system model comparable to models derived from other data extraction methods like interviews and document analysis?
- RQ6 – How does the worker’s project methodology impact assumptions about how email supports project-based analytics?
- RQ7 – What new insights does a working project professional gain by reflecting on email data organized by an activity system model?

A semi-structured interview is employed to understand the various ways in which the project professional uses email to structure, communicate, and revisit project activities and artifacts. The

participant was asked to focus on a specific project that has recently been completed and provide access to a sample of their work email produced during the period in which the project was being conducted.

Next, I assess the project professional's workplace email. In the sample of collected email I search for a central project document that represents key organizing principles of the project, typically found in a project charter, statement of work, or contract. I use the information in the central project document to develop a second activity system model to provide a comparative frame for information collected during the interview session.

Finally, I apply the activity-centric modeling methodology developed during my archival case study to derive an activity centric model of the project professional's email. I group all attachments obtained from the collected email dataset according to the PMBOK process groups, but only those pertaining to the process group that is of most interest to the project professional is analyzed. Although most project professionals are involved throughout the project lifecycle, levels of personal engagement may vary based on the role of the project professional. I triangulate the identified attachments with their associated emails and produce an activity-centric models.

The final event of my investigation involves a reflection exercise with the project professional where I provide the activity-centric models with key findings and ask for any direct insights that might be readily obvious. Through an open and unplanned discussion of the findings I seek confirmation that the derived findings assist the project professional in reflecting on their work and what additional concerns emerge during the reflection that do not seem to be captured directly by the data presented. This serves to validate the activity modeling method as a reflective tool while highlighting its ability to inspire reflection through direct data and associative memories.

5.2 A CALL FOR UX RESEARCHERS TO MAKE INTERNAL WORK VISIBLE

Imagine, Sebastian works as a UX researcher for a midsize technical consultancy. He is routinely engaged in multi-organizational project work meant to help clients develop custom software applications. Sebastian's role involves conducting user research for his client as they look to bring a new product to market or in-house for operational use. Every project that Sebastian joins is a unique configuration of workers focused for a finite amount of time on a joint objective. Many of the people he works with at his consultancy are routinely deployed on the same projects, but varying client demands make it nearly impossible to offer the same team configuration for every project. As a UX researcher, Sebastian is trained in methods of observation and analysis. He has noticed that each project engagement involves two if not more organizations having to bridge work cultures, methods, and tools to effectively collaborate on their joint objective. Over time, he has begun to perceive patterns in the selection of tools and templates that are deployed across projects. Sometimes the projects are successful and sometimes they are not. Sebastian often wonders whether his training in UX could help make these patterns of project work more visible. In doing so, he might be able to find ways of analyzing episodic work to help determine if situated modifications to certain project tools could make a difference in the success of future projects.

The role of the UX professional is typically prevalent in the design and research of commercial products meant to meet the needs of targeted end users. The role is less associated with efforts to research and adapt internal tools and methods required by project professionals during the development lifecycle of commercial products. My research focuses on UX in work. I specifically focus on the project-based organizations (PBOs) that navigate the episodic work associated with product design (Hobday, 2000). I demonstrate through my research that a role

exists for the UX professional to assess and improve the internal tools and methods that are routinely adopted and adapted to meet the situated needs of specific projects.

Teams require tools and workflows to deliver new products to market. The efficiencies and usability of those tools and workflows also require attention. This is especially true when considering the tools and methods that enable project-based organizations to achieve their design objectives most effectively. My research uses an Activity Theory approach (Divine & Zachry, 2018) to model and embed reflective methods and tools as part of the project management lifecycle so that project workers might identify areas of conflict or inefficiencies during the project and pivot to rapidly improve them, or identify systemic issues that might be carried from one project to another. Finding ways to surface, analyze and optimize how tools and procedures are used by a unique configuration of project workers is in itself a UX challenge, one that if met, could have a cascading effect on downstream usability of the ultimate project designs. In my case study I consider a project-based organization tasked with the design of a new system-integrated website for a commercial client. I introduce a multi-method, activity-based approach that includes the analysis of a project worker's email and attachments related to the multi-organizational project. My methods highlight potential areas of contradiction in the way the project team members used tools, adhered to roles, and abode by social rules during the execution phase of the project. Although my study is reflective in nature, my approach provides a method for in-project reflection and demonstrates that reflective assistance during the lifecycle of a project has the potential to not only improve a specific design project but can also help identify systemic issues persisting throughout the entire project ecosystem. Triangulating modeled results from three different data extraction methods, I demonstrate how the identification of key contradictions can surface recommendations for improving the flow of

project activities. The process of identifying and understanding project-based contradictions, I contend, promotes an opportunity for UX professionals to get more involved in the evaluation of internal tools and processes at the center of episodic design projects or similar work.

5.3 BACKGROUND

UX researchers like Sebastian are emerging throughout industry with varying skills and being asked to perform a variety of roles. Given the vast range of opportunities and the skills needed to fill them, the role of the UX professional has been the subject of research attempting to better align the academic approach of teaching UX with the skills being demanded in the workplace. The UX professional can have a varied career involving skills that include but are not limited to; usability testing, content strategy, information architecture, user research, interaction design, and UI design (Getto, 2016). Beyond the research agenda related to education, research has been performed to find efficient ways to sequence UX methods and activities to align more effectively with project management, especially agile methodologies (Kuusinen & Väänänen-Vainio-Mattila, 2012; Kuusinen 2015). The primary focus of both research agendas seems to focus on the skills needed to improve consumer-based products for end users. Little if any exploration of the UX role on improving internal work practices has been conducted. This is especially true in the work of software development projects that often employ UX professionals.

Research related to project management tools sheds some insight on the reasons why UX professionals are needed to evaluate and improve internal project work. As mentioned during the background section of this dissertation, a study by Sajad, Sadiq Naveed and Iqbal (2016), compared seven popular project management applications against IEEE Standard 16326-2009, which provides specifications for project management plans covering software projects. They found that only 63% of the features outlined in the IEEE standard for software development

projects were in fact met by the project management tools analyzed. This means that 37% of the features outlined by the standard are not covered by standard project management tools. These absent features are routinely accommodated by situated project tools created specifically to fill an operational or communication gap within a project, or routinely recycled from project to project to address systemic deficiencies. As new tools are created or appropriated, their use within the project management lifecycle can introduce several contradictions to the preferred flow of work. UX professionals are uniquely qualified to identify and mitigate such contradictions.

Research related to work often involves observable operations of complex instances of knowledge work but tends to overlook more episodic work found in project-based organizations. Activity Theory provides an orienting framework and modeling capability necessary to collect, assemble, reflect, and learn from work-related activities. My research adapts empirical data collection methods to accommodate project work, that by its very nature is episodic and often difficult to observe when multiple organizations are involved. Leveraging workplace email as an archived source of project communications, activities, and tools I can use the modeling capacity of Activity Theory to make hidden work visible. As work is made visible, UX professionals can assist project professionals in modifying project tools and workflow to increase efficiency.

5.4 METHODS

Conducting an activity system analysis involves several qualitative methods aimed at acquiring a rich descriptive data set that can be interpreted and modeled. The most widely used methods in activity system analysis include interviews, document or artifact analysis, and direct observations (Yamagata-Lynch, 2010). My case study uses all three methods of data extraction. To demonstrate the unique contributions each method provides to the collective study, I deliver a

resulting activity system model and discuss its value in making work visible. As each of the three models are developed, I compare them to identify contradictions. It is through the resolution of these contradictions that the potential for learning and improvement materialize.

The first data extraction method uses a semi-structured interview of a project professional with general reflective questions about the subject's professional background in project-based work. Additional questions aimed at understanding their familiarity with the five process groups outlined in the Project Management Body of Knowledge (Rose, 2013), questions meant to ensure that the subject is familiar with terms consistent with activity theory, and specific project questions guided by the activity system modeling structure are included. The resulting activity model represents the more salient features of the project as remembered by the project professional.

To meet the demands of document and artifact analysis I search for a central project document like a project charter or statement of work that outlines the key aspects of the project. Objectives, timelines, the community of participants and their roles, project rules dictating workflows, decision paths, and hierarchies are just a few examples traditionally found in the planning documents of a project that are readily mapped to an activity system model. The resulting activity model often represents the ideal version of the project as it was conceived during planning. It provides a model against which others can be compared to understand the difference between planned work and realized work.

As an alternative to direct observations, which are impossible after episodic project work has been completed, I designed an empirical assessment methodology that uses the project worker's email. Empirical traces of work can be identified, compared, and triangulated with other modeled data sources. By selecting one of the five process groups outlined in the Project Management

Body of Knowledge, the project professional can focus on a single phase of project work bound by a routine objective and a unique set of tools and artifacts selected to achieve that objective. The PMBOK process group serves as the object-oriented activity and helps define a specific time frame during which the project phase was active. Once a time frame for the project phase has been identified, all emails contained in the SENT folder of the project worker, known in activity terms as the *subject* falling within the identified timeline are identified. The subset of SENT messages are then further refined to only include emails that pertain to the project being analyzed. This is achieved initially by conducting key word searches of the email subject lines and attachment names containing project specific references. The email frame is continually filtered to remove non-associated emails or non-email notifications like calendar invitations. Once a final frame is obtained, documenting the distribution headers of the To, CC, and BCC lines of the frame provides an empirical derivation of the community involved in the project phase. Filtering the frame to focus only on email with attachments provides an empirically identified set of tools that were directly used during the project phase. Triangulating the data modeled from the reflective interview of the project worker, the data modeled from the project's planning document or charter, and the data modeled from the empirical assessment of email communications pertaining to the project, it becomes increasingly possible to identify key contradictions between the models. These identified contradictions serve as the basis for new insights related to the social dynamics involved with the project and its supporting organizations. Efforts to resolve these contradictions can not only improve social awareness but provides the very evidence UX researchers need to improve the efficiency of the project tools themselves.

5.5 CASE STUDY: COLLABCORP'S INTERACTIVE WIRE FRAME DESIGN PROJECT

As mentioned in chapter 3, the subject of my case study was a sample of convenience referred by a mutual friend. Conditions of the project worker's participation required complete anonymization of all names and organizations discussed and observed within company email. Once the study was completed and the resulting narrative developed, all names involved were anonymized to the satisfaction of the participant and his employer. The primary organization of my study involves CollabCorp, a project-based organization located near Seattle, WA. A small but growing private company, CollabCorp employs about 700 employees. The company focuses on projects and engagements that assist clients with process improvements through digital transformations. My case study details a specific project that CollabCorp was hired to manage for a regional company that I will call ClientOrg. I will refer to this as ProjectWeb. ClientOrg was engaged in a companywide branding campaign that would require a significant redesign to their corporate website. ClientOrg wanted a new online marketing experience that utilized dynamic content from a backend content management system (CMS). Through an open bid process, the contract to design the interactive wire frames and manage the overall project for the new website was awarded to CollabCorp. The back-end development of the CMS, however, was awarded to a third company that I will call DevTech. This case offers a unique opportunity to study the execution process of a single project with work being coordinated across three different companies for the single purpose of delivering a digital tool to be used by consumers.

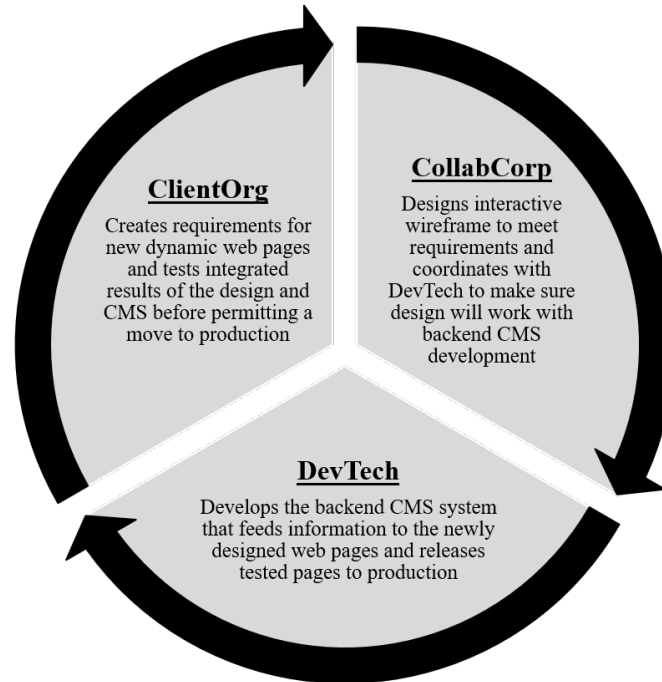


Figure 5.1 Collaboration Configuration for ProjectWeb

Both ClientOrg’s marketing department and CollabCorp’s design team had spent time and resources on UX inspired requirement efforts for the website; however, few resources were dedicated to ensuring the tools and processes adapted for this project were in fact optimized for the task at hand. I claim that dedicating UX resources to better understand internal work, especially episodic project work, can increase awareness of constraints surrounding the situated use of tools and highlight systemic social patterns that if left unattended (and unaddressed) might impact future projects. My research leverages Engeström’s (1987) Activity Theory method for modeling activity systems shown useful in reflecting on, modeling, and improving work. His data collection methods included interviews, document analysis, and direct observations of routine workplace activity. As discussed, direct observation of episodic work is challenging since the motivated activities are temporary, persisting long enough to complete the project at hand. Like Engeström, I utilized interviews and document analysis. My methodological innovation,

however, calls for the empirical assessment of episodic project-based work as memorialized in email to compensate for the inability to directly observe the work being analyzed. My activity system modeling effort also restricts the subject to a single entity, the project worker, and limits the modeling to a single activity system. This choice is not meant to suggest that multi-motivated systems are not worth exploring in project work. The choice merely supports my focus on helping individual project workers reflect on their work. It also addresses limited access to other project subjects residing in partner organizations or subjects that are no longer available due to the episodic nature of the work itself.

5.5.1 *Activity System Modeling*

As data is collected via interviews, document analysis, and email analysis, each data set is thematically grouped to fit the structure of the activity system model. The activity system model is represented in Figure 2 below and models the interconnections between the *subject* or person conducting the activity, the *object*, or motivated purpose for the activity, and the mediating *tools* used to achieve the desired *outcome* of the activity's objective. The model also represents the entire *community* involved in the activity, a mediating *division of labor* which articulates the role each community member plays in the activity, and finally a set of formal and informal *rules* that mediate a successful relationship between the subject and the activity's community. When the components of the activity are brought together in the model, a single unit of analysis emerges highlighting the influence that each node in the model exerts on the outcome of the activity. In my analysis of each data collection method, the subject and the object remain consistent; however, the other nodes of community, rules, tools, and division of labor, show unique differences between the models. These differences are identified as contradictions

(Engeström, 2000; Engstrom, 2001) and it is through reflections on, and the resolution of, the contradictions that learning occurs and opportunity for improvement emerges.

5.5.1.1 The Subject (Gabe B)

Following my methodological approach, the human *subject* of the activity system is a single individual. My case study focuses on the subject Gabe B., the Lead Project Coordinator for CollabCorp. Gabe B. took over responsibility for the oversight of the execution phase of ProjectWeb four months into the project because timelines were being missed and communication issues between the partner organizations were starting to derail the project.

5.5.1.2 The Object (Execution Process Group – ProjectWeb)

Gabe's primary objective and desired outcome during the execution phase of ProjectWeb was to oversee the delivery of interactive wire frames meeting ClientOrg's marketing requirements, while simultaneously meeting the integration requirements of an associated CMS system being developed by DevTech. To achieve this objective, the activity would require significant coordination and collaboration between all three organizations

5.6 DATA EXTRACTION METHOD FOR REFLECTIVE INTERVIEWS

To demonstrate the value each data collection method contributes to the study, I present them one at a time and offer a representative activity system model for discussion. The three activity system models are compared to one another as I progress through my analysis. To begin I present the analysis associated with my reflective interview. Participating in a semi-structured interview protocol, Gabe B spent nearly two hours providing background information on his career in project work, his company CollabCorp, and reflecting on the execution phase of ProjectWeb. The semi-structured interview contained key questions adapted from Mwanza's

Eight Step Model (2002) meant to provide structured guidance to activity system modeling. A table that shows how the Eight Step Model was adapted for use in project specific interviews is presented in Table 5.1.

Table 5.1 Mwanza's Eight Step Model Adapted for Project Worker Interviews

	Identify the ...	Questions to ask	Adapted questions for project work analysis
Step 1	Activity	What sort of activity am I interested in?	Can you recall a recent project that you or other members of your team found challenging?
Step 2	Objective	Why is this activity taking place?	What was the most challenging phase of this project and how does that phase map to the PMBOK process groups?
Step 3	Subjects	Who is involved in carrying out this activity?	<i>The subject in our adaptation is always a single project worker being interviewed.</i>
Step 4	Tools	By what means are the subjects carrying out this activity?	Can you describe for me the standard tools you used to help facilitate work on this phase of the project?
Step 5	Rules and regulations	Are there any cultural norms, rules, and regulating governing the performance of the activity?	Can you tell me about any basic rules one must follow to be considered an accepted member of this project's community?
Step 6	Division of labor	Who is responsible for what when carrying out this activity and how are roles organized?	Can you detail the organizations and participants in this phase of the project and their roles?
Step 7	Community	What is the environment in which the activity is carried out?	Can you list the all the people involved with the delivery this project phase?
Step 8	Outcome	What is the desired outcome from this activity?	What would a successful delivery entail for this phase of the project?

The semi-structured interview provided an opportunity for guided reflection on the project phase being discussed, allowing the project worker to remember salient aspects of the project

based on their memory alone. I used answers to the adapted Eight Step Model in addition to other answers and commentary about the problems and successes with the project and the people involved. I thematically analyzed the answers and modeled these themes using an activity system analysis.

5.6.1 *The Mediating Tools*

I asked Gabe during my interview about the tools required to facilitate work on the project. He responded as follows.

So, it was the mocks and the interactive wireframes and that was about it I would say. We use some project tracking tools - I'm forgetting the name of the tool that they used; it was kind of like Basecamp and whatnot - in order to pass tasks back and forth since the web design or the web development aspect of the project was done from the third party who's also doing the CMS. So, we'd have to find some way to facilitate, and those guys were all offshore. Lot of email communication. I mean, daily standups were a big thing as to how we facilitated everything. But for the most part, Tracking Tool worked relatively well when we actually started putting some rigor into it. In the early stages it was just, "Oh, it's just [task] level." Very choppy stuff, so.... I will add the caveat of if you have a project tracking tool and people use email around that, the email becomes distracting. Yeah. Why have the project tracking tool, which is what happens in most cases?

Gabe identified key tools used during the execution of ProjectWeb. Consistent with the desired outcome of this phase of the project, mock-ups and interactive wireframes were two of the main tools used to iterate on design requirements and assure compatibility with the backend CMS system. The requirements developed by ClientOrg's marketing department were stored and managed in a project requirement application that Gabe recalled as being something like

Basecamp. The multi-organizational project team depended heavily on email to facilitate communication and work across organizational boundaries and it became clear that Gabe was frustrated with requirements and decisions getting lost in email when they should have been updated in the tracking tool. The project team depended on regular stand-up meetings conducted virtually and via the phone to coordinate and progress their work. Given Gabe's senior position, contracts and financial documents were also standard tools that required referencing and amending during the execution of ProjectWeb.

5.6.2 *The Community and the Mediating Division of Labor*

Gabe revealed three companies and at least eight individuals involved in ProjectWeb when prompted to describe his project community.

Yeah, so when I first started engaging on this there was [Todd] and [Mary]. [Todd] was our PM, [Mary] was our designer. Then we had [Sam], who was the client. Then we had [Jasper], who was the third-party vendor. And then we had a bunch of [Sam's] people who were marketing-based, mainly marketing and finance. We had some people who did operational-type work over there. So, there was another [person, Kent], who was kind of our BA-type role. Basically, [Kent] would do all the navigation of the work aside from finance and marketing. Marketing had [Lonni] at the table and on the finance side. So yeah, I would say that that was kind of our core team. And then we had, obviously, third-party developers off to the side and whatnot, so.

CollabCorp was resourced with three individuals, Gabe, Todd, and Mary. The customer, ClientOrg, had three main participants, Kent, Sam, and Lonni. Finally, the CMS developer DevTech had a single contact named Jasper who worked remote from Michigan but managed development resources in India. The community for ProjectWeb involves a complex

configuration of organizations each with its own position of power and responsibility within the project. ClientOrg was the main customer paying both CollabCorp and DevTech for their services on the project. ClientOrg's main role in ProjectWeb was to facilitate requirements for the new site that impacted both the content design and the CMS design. They utilized resources in project management, business analysis, marketing, and finance. CollabCorp, the company the Gabe worked for, was responsible for the delivery of interactive wireframes that met the marketing requirements outlined by ClientOrg and accommodated dynamic content delivered by the evolving backend CMS. DevTech, led by Jasper, was responsible for the delivery of the CMS and configuring its code to work with the emerging designs provided by CollabCorp. Jasper coordinated offshore resources to deliver the CMS configurations needed to support the interactive wireframes.

5.6.3 *The Mediating Rules*

My analysis to this point has yielded few notable contradictions based on the interview data collected from Gabe. The activity model seemed to be providing a consistent representation of the execution phase of ProjectWeb. With any activity there are a set of rules, both implicit and explicit that mediate the relationship between the subject and community and their ability to coordinate effectively in pursuit of the activity's objective. When asked about rules of engagement on the project Gabe offered the following information.

It was interesting. First communication I had with [Jasper], the leader of the outsourced developers was I'm like, "[Jasper], what are you doing, man? Because you should be dropping code like every couple weeks for us to do testing on and figure out." ...seemed like a nice enough guy but just didn't really understand how to accelerate what needed to be done nor did he have the power to pivot the team that he was working with on the

other side of India...a lot of the things that he would say to us were, "Oh, well, that sounds like a change order," or, "Oh, I got to get it into those guys queue and see what we can do. And he's just like, "Well, our program really doesn't do that, that's custom dev." So those are kind of the things, the roadblocks, that he would throw at our way. And I would be like, "Oh my God. Just too much, bud, too much. **We need to figure out how to do better!**" And I just don't think he was empowered to be able to do better... I would come to them and they'd be like, "No. You're not our budget holder. Sorry, man. We don't report to you." Lots of that kind of stuff. Never fun.

Gabe's interview led to several key contradictions in this node of the activity model. First, Gabe complained that Jasper's approach to project work resulted in direct delays to project deliverables. These delays created conflict between ClientOrg and CollabCorp. CollabCorp was responsible for the overall delivery of the design which was realized when design requirements passed user testing in a fully integrated testing environment. To achieve testing, the interactive wireframes had to be successfully married to dynamic content supported by the CMS.

CollabCorp was completely dependent on DevTech's timeline and delivery of the CMS components to successfully iterate and deliver functional web designs. Since ClientOrg hired CollabCorp to deliver interactive wireframes, and those wireframes were dependent on the CMS code being configured by Jasper and the offshore DevTech team, any delay on behalf of DevTech resulted in ClientOrg blaming CollabCorp.

The dependencies between the organizations involved did not seem to be managed by appropriate rules of engagement and responsibility. DevTech was directly hired by ClientOrg, so CollabCorp had very little power to influence the company's working behavior and timeliness. Since CollabCorp was responsible for the successful delivery of the newly designed pages, and

the design was dependent on the CMS system, any delays by DevTech resulted in delays for the designs, which resulted in ClientOrg blaming CollabCorp for missing agreed upon timelines. It was also clear that CollabCorp and DevTech were not able to negotiate rules around methodology since CollabCorp was operating in an agile project environment and the DevTech developers were used to working in a waterfall environment. Although Jasper participated in the agile workstreams and standups, his development resources were delivering code on a timeline that did not work well with short sprints. Evidenced in Gabe's quote about Jasper, there also seemed to be a lack of rules governing a change management process as Jasper would use scope creep or changing requirements as a reason for missed dates. Without defined rules that govern iterative change requests, a formal definition of change goes undefined, leaving change as a safe excuse to justify poor performance.

5.6.4 *The Activity System Model Based on the Reflective Interview*

The interview with Gabe, lead program manager for CollabCorp, resulted in a succinct activity system model of the execution phase of ProjectWeb based solely on guided reflection. The modeled activity system is presented in Figure 5.2.

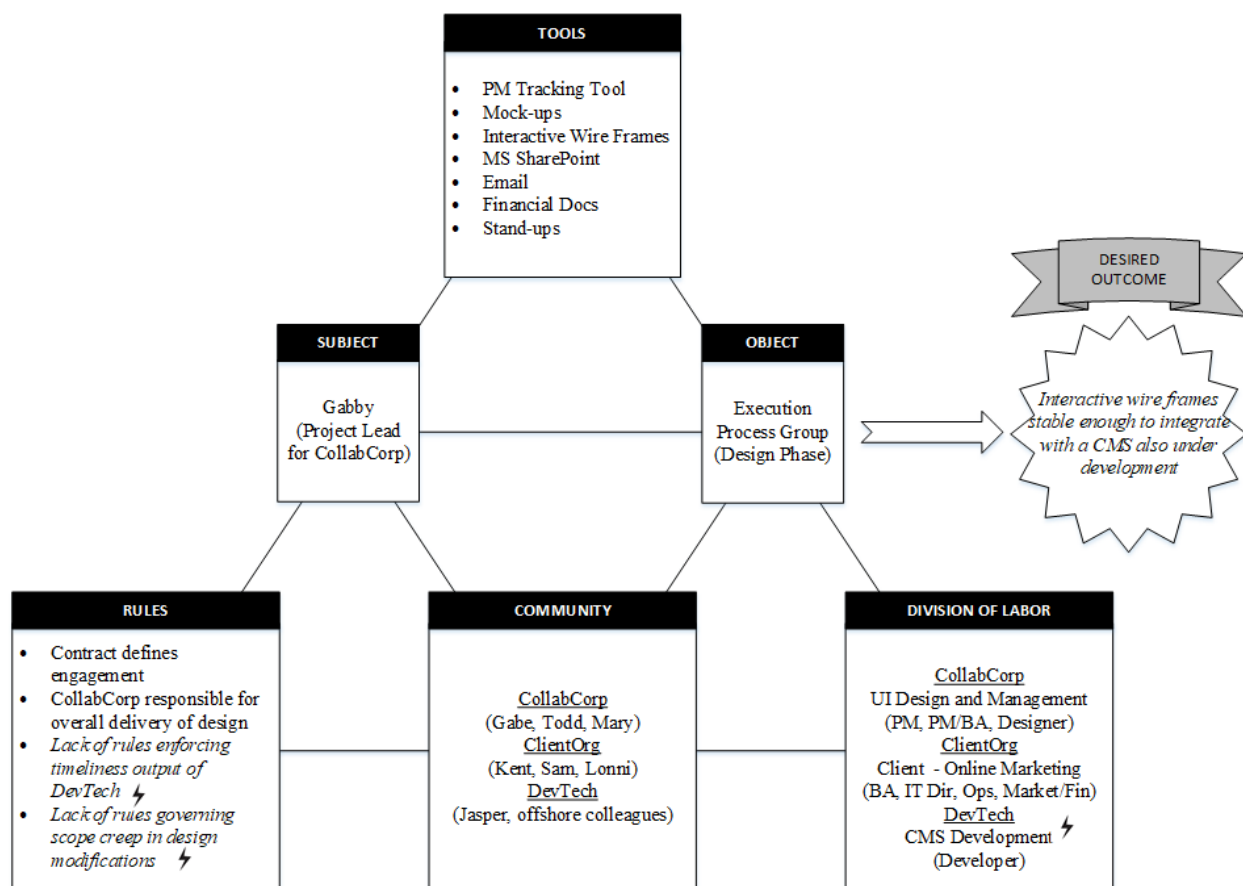


Figure 5.2 Activity System Analysis of Reflective Interview with Gabe B.

Key contradictions identified in the activity system (indicated by a lightning bolt icon) point to a lack of explicit rules that helped coordinate workflow, expectations, and results between the three organizations involved. According to Engeström (2000), these would be considered third level contradictions which occur between the existing form of an activity system and its potential to deliver a more advanced or desired outcome. In my analysis, I could not identify any tools that either helped mediate the lack of rules or provided implicit support to the rules of engagement. The lack of rules binding the multi-organizational configuration led to a secondary contradiction (occurring between the nodes of an activity system) in the activity related to DevTech's role in the division of labor, impacting the desired outcome of the project. Left unattended, these

contradictions resulted in a meandering scope of work, and missed deadlines. The impact of these contradictions resulted in CollabCorp assigning Gabe to the project in July 2018 to help get things back on track. Unfortunately, Gabe was unable to save the project and ClientOrg was removed from the project in December. ClientOrg had delivered most of the interactive wireframes. The end results, however, did not flow and integrate effectively with the CMS. ClientOrg leveraged the designs delivered by CollabCorp and continued working directly with DevTech until they completed the project, nearly two years behind schedule.

5.7 DATA EXTRACTION METHOD FOR DOCUMENT ANALYSIS

Document analysis is another method of data extraction commonly used to inform an activity system analysis. When researching project work, I recommend identifying a central document that details the project's purpose, plan, and resources such as a project charter, project brief, or statement of work. These central documents align naturally with activity system models as they typically define the *objective* of the project, the members or *community* of the project, the role or *division of labor* each member performs, key *tools* and resources that will be used throughout the project and the various *rules* and guidelines that should be adhered to when engaged in the project. When modeled in an activity system format, the central project document reveals the original, "ideal" plan for the project phase and provides a model against which memories or actual empirical evidence of project activities can be compared. Comparing models helps identify areas of compatibility, indicating that things occurred according to expectation. Where the models diverge or are in contradiction with each other, one finds opportunity to learn and improve. CollabCorp typically issued a statement of work that outlined the key deliverables for their projects as well as associated financial instruments detailing the allocation and cost of their resources. A statement of work for this specific project could not be located by Gabe at the time

that he took over the project in July of 2018. It remained unavailable when I conducted my interview. I was able to locate a document called PMTransitionDoc authored by Todd, the original PM from CollabCorp. This document, created to support Gabe's transition to replace Todd on the project, provided a single comprehensive reference identifying the people, processes, and tools associated with ProjectWeb.

5.7.1 *The Mediating Tools*

The transition document provided us with links to ten key tools critical to ProjectWeb. Five of the tools referenced in the document would have been developed during the *Planning* phase. They were created to orient project members to certain engagement rules related to work sequencing and timelines but were continually used as reference tools during the *Execution* phase of the project. These included a site map of ClientOrg's website, a go-no go schedule, a pre-production release plan establishing rules for user acceptance testing and training, a production review process that provided rules of reviewing final content between DevTech and ClientOrg, and a workflow for ClientOrg's marketing department to approve designs. The other five tools detailed in the transition document were all actively used during the *Execution* phase of ProjectWeb and included email, the Wrike system for requirement management, InVision software for design review and markups, an executive level status report, and a SharePoint library for project documents.

When I compared the activity model I generated from Gabe's reflective interview, interesting primary contradictions (tensions occurring within a single node of the activity system) began to emerge. I began to see the acknowledgement of key physical computing tools used to manage various aspects of the project that were not mentioned in the reflective interview with Gabe. Gabe mentioned a requirement system like Basecamp, but I learn through this document that the requirement system was called "Wrike" and it was owned and operated by DevTech. This system

was the trusted source for all requirements and their status. I also learned about a system called InVision which served as a collaboration tool for review and markup of the interactive wireframes produced by CollabCorp. Both systems are important because they factor into workflow rules detailing how the three companies were expected to sequence their work. The final primary contradiction related to tools involves a tool named the Exec Level % Complete Report. The report was an excel file pulled directly from the Wrike requirement system and circulated via email for status updates. This contradiction is important because the verbiage in the central reset document indicates that this specific report must be kept current for regular status updates indicating its importance in conveying progress to project personnel and project stakeholders.

5.7.2 *The Community and the Mediating Division of Labor*

The central document analysis revealed three companies and six individuals involved in ProjectWeb. Though all three companies were represented across the two activity models, there were notable primary contradictions in the make-up of both CollabCorp and ClientOrg and the roles they represented. DevTech remained consistently represented with Jasper leading offshore development efforts. In CollabCorp, only the designer Mary G was listed, highlighting CollabCorp's primary responsibility of design during the project. Neither project manager at CollabCorp, Gabe nor Tom, were mentioned in the project reset document. This may be a result of Todd transitioning away from the project when the document was created and Gabe having yet to be identified as the replacement. ClientOrg was noted as having four resources, Kent, Amy, Daniel, and Lonnie while Gabe's interview only identified Kent (BA) and Lonni (Marketing) in common. Amy and Daniel identified through the reset document were both Technical Operations resources for ClientOrg. Gabe's interview identified Sam, ClientOrg's IT director as a resource however Todd's document does not discuss Sam's role. This was due in

large part because Gabe's position at CollabCorp gave him increased power to negotiate with a higher-level position within ClientOrg. Where Todd was working primarily with Kent and Lonni at ClientOrg, Gabe worked with their superior, the IT Director of ClientOrg.

5.7.3 *The Mediating Rules*

Several artifacts provide details on rules that should have been followed when engaging in ProjectWeb processes. These rules surface key primary contradictions when compared to the lack of rules described during my interview with Gabe. First and foremost, the process tools identified by the central project document define clear rules related to the sequencing of work and the roles each company and contact plays in that sequence. These rules were not mentioned by Gabe during the interview. The *approval flow for interactive wireframe designs* was a specific document that clearly outlined the status points in the approval process and the expected sequence of events needed to transition from one status to the next. However, consistent with Gabe's assessment that the project lacked proper rules enforcing DevTech's timeliness, or rules governing scope creep in design modifications, none of the process documents offer any affordances to keep these two issues in check. This finding, however, identifies specific tools that could be altered to prevent the two main issues raised during Gabe's interview. Additional status definitions or workflow sequences could have been added to the *approval flow for interactive wireframe designs*, assuring DevTech's specific contributions to the collaborative process were made more visible. Highlighting CollabCorp's dependence on DevTech's output and officially holding DevTech equally responsible for missed timelines might have eliminated the very problems that plagued Gabe's predecessor and salvaged the project from its ultimate demise.

5.7.4 The Activity System Model Based on a Central Project Document

To recap, I have assembled two unique activity system models for the execution phase of ProjectWeb. The first model was derived through thematic analysis of an interview with CollabCorp’s lead program manager Gabe. The second model, presented in Figure 5.3, was derived through a thematic analysis of a central project document, in this case a project transition document created for Gabe by the exiting project manager, Todd. By comparing these two models I was able to identify key primary contradictions between the project that Gabe remembered through guided reflection and the same project memorialized in a transition document.

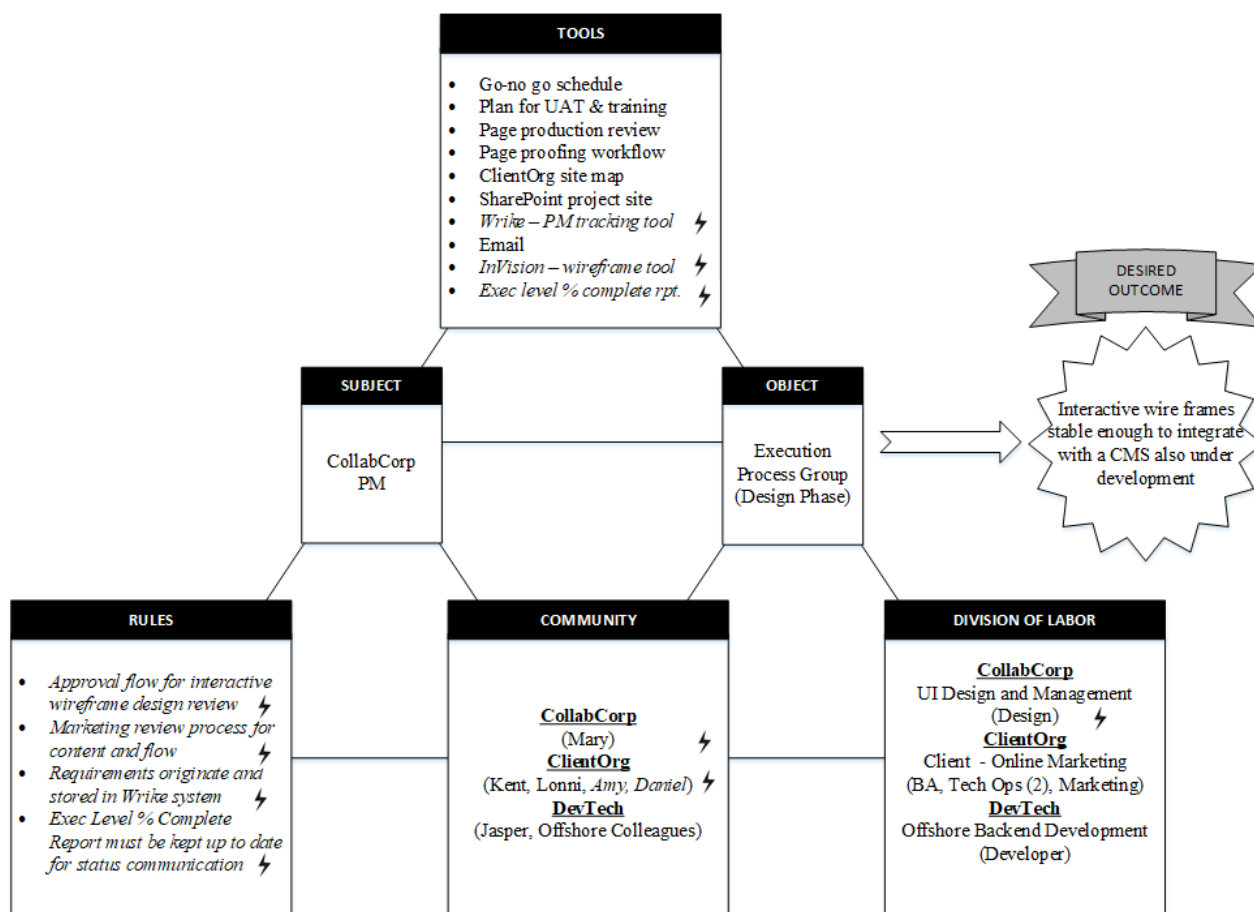


Figure 5.3 Activity System Model of a Central Document for ProjectWeb

Reflecting on these contradictions enables the project worker to identify key tools, rules, and roles that could have been altered to make the project activity more efficient.

A UX researcher like Sebastian, equipped with skills in interviews and document analysis could easily apply activity system modeling to identify improvement opportunities, not only from a perspective of usability, but from a perspective of flow and governance. These two data extraction methods alone produce interesting findings, but the lack of direct observation of the work being studied leaves many open questions. As mentioned, project work is difficult to observe when compared to more sustained and systemic work practices associated with knowledge work. If UX researchers were assigned to monitor a project in process, direct observation could yield rich results. In the case of my example, the project finished, and the companies are no longer associated. The project professionals of CollabCorp, however, take on new clients daily and recycle many of the project tools and resources I have reviewed in my study. Without an agenda to constantly reflect on the mediators of projects (tools, rules, and roles) project professionals run the risk of recycling failed mediators in future projects.

5.8 DATA EXTRACTION METHOD FOR EMAIL ANALYSIS

I now turn my attention to a data extraction method meant to allow empirical analysis of work activity even after the work has been completed. By accessing a project worker's email, framed to include only SENT email associated with a specific PMBOK process group, one can access memorialized workplace communications and acts of collaboration for a past project. Binding the object to one of the five PMBOK process groups (initiating, planning, executing, monitoring, and closing) allows all project professionals to use a consistent orientation for this type of analysis, regardless of the project management methodology they employ. Waterfall managed projects and agile managed projects each have their own unique aspects to project phasing, but

the PMBOK process group is generic enough to apply to all types of projects and is typically identifiable by project professionals. Email was selected as an empirical source for work analysis because its use in project-based organizations is nearly ubiquitous. Other project management tools currently on the market like Slack, Trello, Jira, Wrike, Teams, etc. could serve in place of email; however, few of those tools are designed to carry communication across organizational boundaries. They are great resources for internal teams of an organization but once a project team is comprised of multiple companies, those products present challenges to uniform access, security, and retention configurations. Email is a consistent and reliable method of communicating and sharing project artifacts across communities of practice and organizational divides.

Gabe's SENT email folder was limited to the date range of the execution process group for ProjectWeb. The distinct date range was July 1, 2018 to March 1, 2019 reflecting the time frame that Gabe joined the project until ClientOrg removed CollabCorp from the project and began working directly with DevTech to complete delivery. The email collection meeting the date range was filtered further to remove any emails not associated with ProjectWeb. Although Gabe's dataset was easy to obtain because he organized his work email using project folders, many project professionals do not bother sorting their email by project. In cases such as these, project specific email can be identified using key word searches against the email subject line or leveraging the email distribution header (To, CC, BCC) to identify key project members. Gabe's final Outlook dataset consisted of 121 emails that he personally sent or forwarded about ProjectWeb. This frame did not consider emails that communicated project-based calendar entries. Once the frame was obtained, a thematic analysis was conducted to translate key components of email into an activity system model. Gabe of course remains the subject of the

activity, and the object is bounded by the chosen PMBOK process group. In this case, the Execution process group involving the design of interactive wireframes was chosen. The distribution headers (To, CC, BCC) reveal the total community membership receiving project specific messages. Anyone receiving a message is considered an interested member of the project community. Attachments found in email are operationalized as being direct tools in service of the project. Of Gabe's 121 SENT emails, 13 of them had attachments, and each email with an attachment had only one artifact attached. The two nodes of the activity model that are not easily derived directly from email are Rules and the Division of Labor. Many times, the attachments will reference documents generated during the *Planning* process group of a project and can be referenced for rules of engagement and sequencing flows, much like I saw when I modeled the components of the central transitions document for ProjectWeb. Email signatures can be leveraged to determine roles or division of labor of individual community members, but that derived data should be confirmed with the project professional participating in the analysis. The derived activity system for Gabe's SENT email pertaining to ProjectWeb is modeled in Figure 5.4. At first glance one can see how robust the results from an empirical analysis of email can be. Next, I triangulate this model with the two models derived previously to identify additional contradictions that can contribute to Gabe's growing assessment of ProjectWeb.

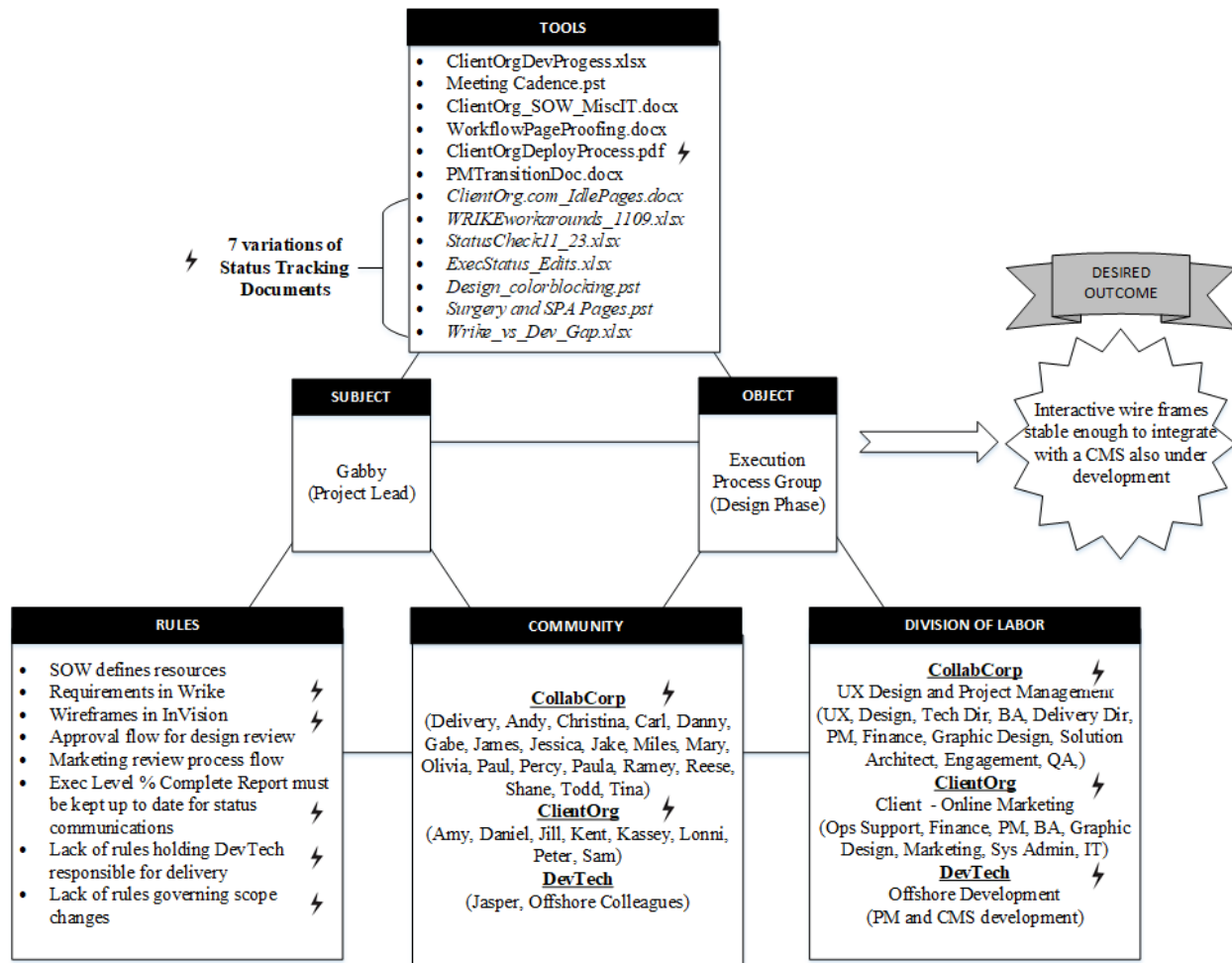


Figure 5.4 Activity System Model of Gabe's SENT Emails for ProjectWeb

5.8.1 The Mediating Tools

When using the email analytic method for activity system modeling, the SENT email frame should be filtered for attachments to identify a portfolio of tools that were intentionally used during the phase of the project being analyzed. I take email as a given tool used to intentionally communicate and distribute project artifacts to the project team and stakeholders. Other project tools, of course, are also at play in the activity being modeled besides those identified via the email analytic methodology. I have seen several of those tools included in my analytic using other data extraction methods, namely design software, project management applications, and

stand-ups. Unfortunately, it is not always possible to access direct assessment of these tools in a manner that was consistent with their use on a project. By focusing on the attachments in email one can obtain an empirical dataset that includes tools specifically situated to meet the demands of the project. In fact, because they are identified in the SENT folder, they represent tools specifically used by the sender to mediate their project objective. In addition, when attached to email, the tool is often accompanied by text in the body of the email that provides contextual background related to the tools' role in mediating the object of the project.

In my case study, Gabe's SENT folder contained 13 unique attachments representing tools that Gabe intentionally used or shared during the execution phase of ProjectWeb. In total there were six variations of MS Excel spreadsheets, three examples of MS Outlook files referencing old emails, three MS Word files, and one PDF document. When grouped by their functional role in ProjectWeb one attachment related to a resource contract and statement of work, four attachments represented workflow rules, and eight of the attachments represented some variation on statuses related to design requests. The contract document merely provided costing expectations for a temporary resource to be added to ProjectWeb. Two of the four workflow documents have already been discussed as they included the central project transition document modeled earlier and the page proofing workflow artifact that the transition document referenced. The third document was a proposal for a new meeting cadence which raised interesting data related to the division of labor that I will discuss later. The fourth artifact representing workflow, was the emergence of a tool called ClientOrgDeployProcess.pdf. This artifact offers a workflow diagram detailing the collaboration flow between the three organizations, sequencing each organizations' step in the design process and the dependencies that existed between them. This artifact was a joint creation negotiated by CollabCorp's Gabe and DevTech's Jasper. This artifact

represents a primary contradiction in the role of a critical tool. It highlights the fact that the rules of this phase of the project were lacking an explicit structure to mediate the most efficient collaboration strategy between the organizations involved. This artifact seems to be a direct attempt to mitigate the lack of rules that Gabe indicated during his interview that were plaguing when he joined in July of 2018 and that ultimately led to the project's demise. The fact that it was not recognized as such, is the basis for the contradiction.

The more important finding related to the tools identified in the email analysis for ProjectWeb centers on the seven variations of status documents circulating in Gabe's SENT mail alone. This indicates a significant primary contradiction in the role of status documents throughout the project. Although several of the artifacts appear that they originated in alignment with, if not directly from, the Wrike requirements system, none of the documents had consistent titles, nor did they contain any form of uniformity across the status structure. Some documents could be tracked back to an originating ticket in Wrike, but in many cases the notes, statuses, and details were orphaned completely from the source system, requiring significant effort to marry the appended information back to the original source. I was unable to identify indicators that also tied the requirements to the InVision system used for interactive wire frame development. This variability in the status and requirement sharing tools is a strong indication that scope of the project, and the evolving design changes, were not properly controlled. This is consistent with the major issues Gabe revealed in his interview. Because the status tools did not properly control the flow of work against the requirements, many of the unique artifacts found in Gabe's SENT folder were created to help take an inventory of the work completed to date and establish a new baseline of work for the re-set of the project. For example, `Wrike_vs_Dev_Gap.xlsx` was an inventory created to compare all the design requests in Wrike against the actual production

website to determine what work had been completed and what work remained. Had the requirements been controlled properly from the beginning of the project, this tool would not have needed to be created.

5.8.2 *The Community and the Mediating Division of Labor*

One of the more telling aspects of the activity system modeled from the email analytic is the vast size of the community recorded when modeling all distribution information related to Gabe's SENT messages. The details can be found in Figure 5.5. The total frame revealed 29 unique individuals, 17 of whom were not included in either the reflective interview or central project document models. This primary contradiction found between the community profiles of each model suggest that stakeholders to the project were not generally acknowledged as key community members when thinking about or documenting the project. Gabe's company alone has 14 project community members who were not mentioned in the other data collection activities. This highlights two key concepts. First, Gabe's email suggests a much larger communication pattern with other members of CollabCorp not directly associated with the Execution phase of ProjectWeb. This has much to do with Gabe's lead role within the company and suggests that he had an opportunity or responsibility to leverage other lead members in his company as he navigated the reset of ProjectWeb. For a company that makes revenue off project resources, the involvement of this many additional individuals should be analyzed further to understand the true impacts of the project's cost.

Company Name	Employee Name	Employee Role Based on Title	Identified in Reflective Interview	Identified in the Central Project Document	Identified in Email Analytic
DevTech	Jasper M	PM Lead	YES	YES	YES
ClientOrg	Kent J	BA	YES	YES	YES
ClientOrg	Lonni B	Marketing / Finance	YES	YES	YES
ClientOrg	Sam B	Director of IT	YES	NO	YES
ClientOrg	Amy W	Operations Support - Tech Lead	NO	YES	YES
ClientOrg	Daniel B	Finance Director	NO	YES	YES
ClientOrg	Jill M	Program Lead	NO	NO	YES
ClientOrg	Kassey S	Graphic Design	NO	NO	YES
ClientOrg	Peter S	System Admin	NO	NO	YES
CollabCorp	Mary G	Designer	YES	YES	YES
CollabCorp	Andy M	UX Designer and QA	YES	NO	YES
CollabCorp	Delivery Team	Project Managers	YES	NO	YES
CollabCorp	Carl F	BA / Tester	YES	NO	YES
CollabCorp	Gabe B	PM Lead	YES	NO	YES
CollabCorp	Todd G	PM Original	YES	NO	YES
CollabCorp	Christina C	Managing Director of Tech	NO	NO	YES
CollabCorp	Danny F	Managing Director of Delivery	NO	NO	YES
CollabCorp	James K	Finance	NO	NO	YES
CollabCorp	Jessica V	Designer	NO	NO	YES
CollabCorp	Jake C	Solution Architect	NO	NO	YES
CollabCorp	Miles C	Engagement Manager	NO	NO	YES
CollabCorp	Olivia K	QA	NO	NO	YES
CollabCorp	Paul T	Engagement Manager	NO	NO	YES
CollabCorp	Percy C	UX Engineer	NO	NO	YES
CollabCorp	Paula B	Software Engineer	NO	NO	YES
CollabCorp	Ramey L	Product Architect	NO	NO	YES
CollabCorp	Reese H	Tech Ops Lead	NO	NO	YES
CollabCorp	Shane B	Director Solutions Delivery	NO	NO	YES
CollabCorp	Trina H	Director Client Dev	NO	NO	YES

Figure 5.5 A Comparison of Community Members by Data Extraction Method

I noted a significant secondary contradiction (a contradiction occurring between two nodes of the activity system) when reviewing the MS Outlook file attached to one of Gabe's SENT emails. This file outlined a new meeting cadence that was being established as the original project manager Todd was leaving the project and Gabe was onboarding. The MS Outlook file was a message thread between Lonni, ClientOrg's key marketing contact and the departing project manager from CollabCorp, Todd. Lonni indicates in that thread that although Gabe was joining the project to replace Todd, many of the tasks that Todd was facilitating in his division of

labor would in fact be assigned to Lonnie as the transition was implemented. As Gabe took over as the lead project manager for CollabCorp, he thought it more appropriate that the lead marketing resource at ClientOrg should handle key coordination duties between the organizations. Although Gabe and Jill's titles and roles remained the same, the labor associated with the roles changed significantly during the reset. These changes, however, were not officially documented in any of the legacy project documents. Such a transition in the division of labor can have substantial impacts on all mediating nodes of the activity system. A single change in project personnel can impact the rules the original team follows as well as the tools situated to specific project flows, especially if the division of labor varies significantly from the person's title and the perceived responsibilities that follow that title.

5.8.3 *The Mediating Rules*

Another significant secondary contradiction between the nodes of mediating tools and mediating rules centered on the Exec Level % Complete Report. This report was identified in the central project document analysis as a required report that must be updated regularly. Gabe's email offers a variation to the report called ExecStatus_Edits.xlsx. Gabe insisted that the original report lacked the structure necessary to accurately reflect the completion of work. Requirements had varying degrees of percent complete and it was near impossible for Gabe to determine how to interpret percent complete in terms of time. One requirement that was 43% complete might take 5 days to finish, whereas another requirement at 78% complete might take an hour to finish. Gabe offered a replacement model that tracked completion based on the phase of production the requirement was in during the time of status. A requirement in design would be 25% complete, a requirement in UAT would be 75%, and so on. This recommendation would allow for a more accurate reflection of the status of a requirement and tie it back to an area of responsibility. Had

this modification been adopted by the project community as a revised tool and a revised rule for the project community it may have helped mitigate the growing confusion between the collaborating organizations.

5.9 REFLECTING ON THE THREE ACTIVITY SYSTEM MODELS

As we look across all three activity system models and the contradictions they surface, we can identify specific themes for improvement. These themes, rooted in the Execution phase of ProjectWeb, can be considered for future projects since the project analyzed is no longer operational. The tools and the people that were part of this temporary engagement will go on to perform in other episodic engagements. Learning how specific mediators impact an activity system can at the very least encourage project professionals to reflect on those mediators when encountered in future work.

My case study surfaced several key contradictions for ProjectWeb. A comprehensive table listing the identified contradictions can be found in Appendix F. These specific contradictions, as discussed throughout my study, were reviewed with Gabe for his own personal reflection and learning. The reflection exercise yielded key themes for improvement that Gabe could implement on any future project.

5.9.1 *Reflective Insights from a Focus on Tools*

In the area of tools, a key recommendation was made to eliminate multiple sources for status control and status communication when engaging in future projects. When presented with the activity system from the email analysis that showed 7 different formats used to convey status updates Gabe laughed saying, “I knew it was bad, but I didn’t realize it was that bad”. Gabe acknowledged his attempts to alter the Executive % Complete Report that was routinely

circulated insisting that the format was useful. When asked why he thought there were so many status documents being circulated he replied,

“It is very representative of the chaos experienced during the project. When I joined the project, we had to dig into everything to find the status of work. Everyone was on different pages. Just looking at the name of the documents it brings back all these side projects I asked people to do just to surface the current state of requirements. The requirement system and the development site were completely out of sync and we needed a baseline to figure out how much work was actually left.”

I advised Gabe that in the future he might attempt to identify a single communication tool that pulled information directly from the requirement system and allowed updates. He could then devise a routing strategy that allowed updates to be married back to the source system on a regular cadence. Further, this single tool should deliver a status that is both informative and actionable. Gabe recalled his attempts to change the Executive % Complete Report to make it more actionable, but that at the late stage of the project his request was not a priority. He acknowledged that if he had access to specific examples of status documents like those presented in the activity system derived from email that he might have been able to convince others, and to some extent himself, that the multiple status documents were hurting the situation instead of helping. He indicated that he would pay more attention to this on future projects.

5.9.2 *Reflective Insights from a Focus on Rules*

In the category of rules, where some are explicit and others implicit, I recommend that more focus be applied to explicitly stating rules and making them visible throughout the life of the project. Rules are often dictated through tool design and it is important to understand this relationship. As a tool is altered it is important to be mindful of how that alteration can

undermine or completely change rules of engagement. When reviewing the workflow documents highlighted by the central project document activity system, Gabe recognized them but stated,

“Yeah, I knew that Todd (the original PM for CollabCorp) had worked with [ClientOrg] to figure out all those workflows, but I assumed when I joined the project that everyone was aware of those flows. I didn’t think I needed to rehash that work. Maybe that was a mistake. Given the time constraints and our attempt to save the project we were moving quickly so it probably wasn’t the best time pick at people for not following a workflow created so early in the project.”

Gabe acknowledged that he routinely works through flows that define rules of engagement during the planning stages of a project, but rarely revisits those rules and documents on a regular basis. This is something that he will consider in future work, finding a way to build in a systematic reorientation to project workflows.

5.9.3 *Reflective Insights from a Focus on Community*

Finally, in the categories of community and division of labor I suggest explicitly redocumenting any changes in the actual work responsibilities when project team members enter or exit the project. This effort will help eliminate confusion between actual responsibilities and the perceived responsibilities associated with title or position. Gabe acknowledged that during the reset of the project they did not take the time needed to adequately redefine the division of labor. Gabe confirmed that when he joined the project to replace Todd, the original PM, that he was contributed labor that was not being billed to the client. Given his role in the company and the fact that CollabCorp was not billing ClientOrg for his services, he felt justified in transitioning certain responsibilities away from his PM role and placing the burden back to the client. When asked about how this was communicated, Gabe stated,

“Honestly, I took it as a given. The original PM didn’t work out. He was let go. I was focused on higher level tasks to get the project back on the rails. I was not there to handle the day to day. That was something that [ClientOrg] should have been handling anyway.”

When asked whether this assessment would have helped them identify specific ways to help people work together Gabe indicated that if time were not such a pressing concern, they all could have done a better job resetting the project and communicating new expectations.

“I would definitely, definitely, definitely agree with that. I don't think we ever reset appropriately. And I think that there were so many people involved, who had their belief of how things were working. And there was no governance over that. I mean the client stakeholder went to his management numerous times, and just basically bitched about his own staff and is like, I can't get these guys to function appropriately to get things done. So, it was hard. Just a mess, just a mess.”

When demonstrating the vast difference between the community members identified across the activity systems and noting how many more individuals were found through the email derived analysis Gabe wasn’t terribly shocked but found it very interesting.

“Well it makes sense to me that I would have emailed so many people within my own company given the effort to get this thing back on track, but you raise a great point about costs. My efforts were not being billed to the client. None of these people’s time was billed.”

Highlighting this data really made an impression on Gabe. He even indicated that this was one area that he thinks management would be really interested in analyzing further. How much time is management engaged in online communication that is not billable?

5.9.4 *General Impressions of the Reflective Value of Activity System Modeling*

Gabe provided general impressions about the value of activity system modeling using email based on our case study experience. He indicated throughout our reflection that the findings were very representative of his experiences and that having specific examples organized in activity systems would have really helped make a case for specific changes. Although there were several lessons learned that he noted he will carry with him in future planning sessions, he acknowledged that given the time pressure he would not have had the luxury to execute this kind of research in real time to be effective. When asked if he thought whether this work would be beneficial if they had a dedicated researcher constantly looking at this type of information, he replied,

“Oh, absolutely. Yeah. No, no, absolutely. I think this is highly helpful and it's what we saw throughout the process. But I think it came back down to just the [Sam] guy not being empowered and not having the right ability to push and make things go well. Like just too many people running. This is a massive project that crossed all of [ClientOrg]. And basically, you know, how do you herd the cats at that level? No one was listening, so...you know...they didn't make it urgent enough because the ownership of [ClientOrg] doesn't understand technology, doesn't understand the heavy lifting that needs to be done in order to pull something like this off.

Despite the aid that the activity systems provided for reflection there seemed to be certain things that were not represented that Gabe still believed to be root problems, such as the client's ability to understand the nature of such a robust technical project. Even if empirical examples could be found in email that supports Gabe's notion of ClientOrg's inability to comprehend the project, certain points may be more inflammatory than helpful when tensions are as high.

5.10 CONCLUSION

The method I designed to extract data from email and thematically model it using an activity system analysis shows great promise for surfacing empirical evidence of episodic work. Making work visible through activity system models allows UX researchers to not only triangulate multiple data collection methods, but in the process, surface key contradictions to highlight opportunities for improvement.

Focusing on SENT mail keeps all work directly related to the subject of the analysis and assures that their individual perspective and involvement offers personal growth opportunity. If this analysis were conducted for all members of a project community, and the results were aggregated, a more complete picture of the activity system would emerge. Activity system models could even bring structure to project retrospectives and postmortems, allowing project members to compare and discuss specifics of the project, complete with empirical examples to support their claims.

The effort required to manually model activity systems using metadata from email is significant. As Gabe mentioned during his reflective session, he would have a hard time conducting this type of analysis when dealing with the pressure of a project that has gone off the rails. This reinforces the notion expressed throughout this dissertation that a research role dedicated to internal UX discovery is warranted. A tool is also needed to bring some level of expediency to the process. To advance this capability I will leverage the information learned through my research to develop a data transformation protocol aimed at making email metadata easier to visualize on a more rapid scale.

This work offers a whole new frontier for UX researchers like Sebastian, the UX researcher introduced at the beginning of my study. Training in methods like Activity Theory, that help

surface the dynamic interplay of humans, the tools they use, and the social contexts in which they work, will open opportunities beyond the traditional focus on consumer products. Such a comprehensive way to view work is needed to truly appreciate the interdependencies involved as tools are dynamically created, altered, and abandoned to meet the demands of episodic project work. Had Sebastian been a UX researcher dedicated to internal work analysis during ProjectWeb, he may have been able to use the results of such an analysis in real time to substantiate and socialize some of the key instincts that Gabe had to save the project. He may have suggested modifications to status documents and the workflow rules that generate them. He could have modeled potential impacts of altering the division of labor. He could have even surfaced key usability improvements in the primary source systems like Wrike and InVision that could improve cross-organizational use. Even if Sebastian had conducted a historical analysis as represented by my case study, he would still provide workers like Gabe with thematic improvements to consider when recycling tools, rules, and divisions of labor for future projects.

Chapter 6. E.D.A.S. – A VISUAL DESIGN FOR PROJECT EMAIL

6.1 OVERVIEW

My work to date has required significant amount of time and effort to prepare an email data set for project work analysis. Before activity-centric models can be created, the associated emails pertaining to the project must be identified. Without project defining affordances, email remains an unstructured source for evaluation further complicated by the organizing strategies of individual employees. In this chapter I set out to answer the following research question.

- RQ8 – What design accommodations can be made to support the reflective analysis of email for project workers?

I review research literature related to activity-based system designs and discuss the concept of social translucence to help guide my design of an interactive visualization to support both project workers and the analysis of their work. To reduce analytic overhead and to offer consistency in the framing of email based material across multiple members of a project, I present a data transformation protocol for Outlook .PST files and a visualization design of the resulting data in a Tableau model I call E.D.A.S. (Email Derived Activity Systems). Through the development of this interactive visualization, I highlight key features of the activity system that cannot be derived directly from email, capturing data transformation steps that require input from the project worker participating in an assessment exercise. The email derivation design is influenced by Activity Theory with analytical goals of assessing mediated work activity through a focus on *tools* (attached work artifacts), *subjects* (project team members sending emails), *objects* (the five PMBOK process groups), *rules* (input required), *community* (collective project team based on distribution headers To/Cc) and the *division of labor* (input required). I test the resulting

visualization protocol with a project worker at University of Washington's International Health Metrics and Evaluation and offer findings for future iterations and a potential application design.

6.2 RESEARCH RELATED TO ACTIVITY-CENTRIC DESIGNS

6.2.1 *Predictive Activity-centric Designs with User Defined Activity Structure*

There are several examples of research projects that use an activity-centric lens for system design. Three notable designs based on activity theory include UMEA, TaskTracker, and CAAD. These systems attempted to automate in some way the interpretation of an activity-based structure derived from work processes and artifacts. UMEA which stands for User-Monitoring Environment for Activities was a desktop-based project control center that allowed users to define project spaces complete with folders, documents, and contacts (Kaptelinin, 2003). The system would monitor user activities and automatically add new resources to active project spaces. The system also incorporated standard PIM functionality which it used as the proxy for user defined project goals related to the activity system structure. The basic intent of UMEA was to break from the traditional hierarchical structure imposed on the organization of coordinated work and instead offer a structure that better suited the goal directed nature of activity systems. The authors noted through empirical user assessments of the system that two issues related to the design involved the effort required by users to clean and maintain a list of project-based resources and the algorithms needed to automatically rank resources and allocate them across valid project resources. Multiple purpose activities, an area of constant investigation among practitioners of activity theory, made real time allocation of resources difficult to map. Kaptelinin suggested that one solution would be to find a way to allow the user to complete the multiple purpose activity sequence and then propose potential structures that the user could adopt

or abandon. This system design is predictive in nature but still depends on a user defined structure for activity.

TaskTracker, developed by Stumpf, Bao, Dragunov, Dietterich, Herlocker, Johnrudes, Li and Shen (2005) expanded on the principles afforded through UMEA by attempting to identify resources and allocation strategies beyond the Microsoft Office platform and incorporate additional knowledge work interactions across the Visual .Net environment, the entire Windows XP operating system and even user phone calls. TaskTracker required users to manually specify when they initiated a task to start the data collection sequencing. This user-initiated requirement would then help the system train future prediction mechanisms related to task identification and relevant folder selection.

CAAD, Context-Aware Activity Display, was another extension of the desktop metaphor that attempted to offer knowledge workers an activity-based view of their work and associated resources to accommodate the dynamic nature of task management (Rattenbury & Canny, 2007). This system would gather cues automatically from computer interaction events without requiring direct upfront involvement and overhead structuring from the user. The system used custom pattern mining algorithms to identify structures within the user's workflow to make real-time predictions and encode content and context of the user's activities. The system would provide visual groupings based on these contextual inferences so that the users could reflect on their work behavior.

UMEA, TaskTracker, and CAAD each attempted to identify and aggregate resources and artifacts using an activity-centric framework in real-time using goal directed proxies (PIM tools and user task acknowledgements) to orient the structure. Building on lessons learned, a progression can be seen in the designs in the intent to capture not only resources of an activity,

but the historical context in which the activity was conducted. The intention to provide information that served not only actual work, but worker development through reflection was also a progression noted throughout these development strategies. My research differs in its agenda in that it does not attempt to structure cues about activity in real time, rather it attempts to structure email and artifacts that have already been created. The challenge however is the same, in that a suitable proxy must be identified within the structure that highlights the user goal or motive and still delivers information in a way that allows the user to reflect and learn from the activity-based context surrounding email and associated artifacts. I address this challenge in my design by introducing PMBOK process groups to bind the object of the activity being analyzed. Despite the multiple methods exercised in project management work, the PMBOK process groups offer large categories of tasks that can fit the general workflow of any project. The project worker needs to define the date ranges that associate each process phase and those date ranges are used to categorize email for the analysis of that project phase.

6.2.2 *Non-predictive Activity-centric Designs with User Defined Activity Structure*

Activity-centric designs have also been developed to aid workers in a way that gives them full control over the organization of their tasks and related activities. Sphere Juggler (Morteo, Gonzalez, Favela, and Mark, 2004) was a system design that helped users organize “spheres” that related information resources like documents, contacts, and emails in a way that related to specific tasks. Their goal was to reduce fragmentation caused by task switching. This design put the user in charge of defining the tasks and the supporting material of those tasks. Unified Activity Management (Moran, Cozzi, & Farrell, 2005) offers a semantic model of a unified activity promoting the aggregation of related activities, artifacts, and communication sources into a single workplace. Activity-Based Computing (ABC) presented by Bardram, Bunde-Pedersen,

and Soegaard (2006) expanded yet another aggregation model of activity that attempted to group activities across multiple computers. IBM's product called Activity Explorer (Geyer, Muller, Moore, Wilcox, Cheng, Brownholtz, Hill, and Millen, 2006), was developed in IBM's direct effort to "reinvent email." Based on complaints of email overload and research that showed people were using email to manage work activities beyond simple communication (as seen through our discussion of PIM), IBM offered a product that could, "bridge this gap between informal ad-hoc communications and highly structured work spaces." (Geyer et al., 2006, pg.714). Their system design uses the concept of an activity, modeled as a group of related resources representing a project. Users create and manage activity threads by adding or deleting related communications, responses, or artifacts. Initial designs supported five object types including: messages, chat transcripts, files, folders, and annotated screen captures. Beyond the technical design, this work introduced the concept of activity-centric collaboration, similar to the unified activity philosophy presented by Moran et al., which spans a continuum of technologies supporting collaborative work: from the ad-hoc communication facilitation found in email, to the shared structures found in project workspaces, and finally to the formal siloes of process management systems that regulate human resources and client relationship management. Although these designs seem more comprehensive in their aggregation of multiple media, modes, and artifacts that are instrumental in collaborative activities, they still depend on user defined structures in situ. These approaches might enable better collaboration, but they do not offer an outside perspective of activity that could be challenged by an actor in a way that offers reflective assistance in personal development. My research uses some of the same structuring philosophies presented through activity-centric collaboration but aims to seek an orienting structure through subcomponents of one communication tool like email. Instead of using the

aggregation of multiple communication sources to understand human activity my research to date has shown that the dissected structure of email can also offer activity-centric insights into the collaboration process. Since the informed interpretation of activity is offered through independent structural assessment, it also offers the subject a chance to compare the assessment against assumed project structures or mental models and learn from any contradictions.

Work by Balakrishnan, Matthews, and Moran (2010) focuses on activity-centric computing (ACC). They studied the use of Lotus Activities described as an ACC system. The authors, following up on Moran's earlier work, focused their attention on solving artifact and activity fragmentation encountered by knowledge workers. "ACC systems encourage users to structure individual and collaborative work around the construct of an activity by supporting a diverse set of actions within a single tool and enabling the consolidation of related people, artifacts, resources and actions." (Balakrishnan, 2010, pg. 787). Interviews with users of Lotus Activities showed that they chose to use this system to avoid using email as the space for collaborative work and used it primarily to organize artifacts based on activity-centric structures. Beyond the continued evidence that email fails to support collaborative insights, my research provides a continued reminder that any design related to email must provide some artifact structuring techniques that makes visible any artifact that is considered related to an activity. Since email attachments are a major consideration in this research, this is one design condition that must be met if there is any chance for the utility of the resulting design to be adopted.

6.3 GUIDANCE LEVERAGED FROM WORK ON SOCIALLY TRANSLUCENT DESIGNS

The ultimate objective of this research is to produce an activity-centric structure for email that can eventually be used to produce a socially translucent system capable of comparing project-

based activity systems. To explore this more fully, research that helps define and orient socially translucent and activity-centric systems is warranted.

Erickson and Kellogg (2000) introduced the concept of social translucence in their call for the design of digital systems that not only support collaboration among large groups of people over computer networks, but does so in a way that makes participants and their activities visible to one another. The authors developed a prototype called Babble, to implement social translucence through an online communication system. Drawing upon examples from architecture and urbanism, the authors found certain constancy that could translate to the digital world. They state that a socially translucent system offers three characteristics of visibility, awareness, and accountability, all of which combine to form the basis of social interaction. In their critique of current systems, email is one communication media that fails to offer social translucence.

“There are a host of problems: addressing; managing threads; bringing other people into the middle of a conversation; keeping a conversation on track; knowing who (or whether) anyone is listening; people to respond in a timely manner; finding all messages with crucial information in them; etc. It is difficult to conduct a long-running, productive conversation through the digital medium, especially if there are more than a few people involved.” (Erickson & Kellogg, 2000, Pg. 60).

Having access to social cues of our surroundings, including an understanding of who is listening to or observing our actions, has a profound impact on the way we govern or coordinate our activities. The authors continue to state,

“Knowledge management is a currently popular term for the attempt to provide organizations with tools for capturing, retrieving, and disseminating information about their own activities to their own employees. In a sense, it is an attempt to make

organizations self-conscious, to enable them to tap their own experience in solving problems rather than having to reinvent solutions to recurring problems. Knowledge management is often seen as a problem of putting useful information into databases and providing schemes for organizing and retrieving the information. This perspective leads people to think in terms of data mining and text clustering and databases and documents. This is not wrong, but it is only part of the picture...having the information in a database is not as useful as we would hope, unless it also provides an *entree* into the social networks that produced the data. It is from the social networks – not from the information itself – that social resources can be recruited” (Erickson & Kellogg, 2000, Pg. 65).

The focus of my dissertation centers itself in the arena described by the authors as knowledge management and attempts to codify a structure for email that produces a database of information for useful retrieval. The intent of the design however goes beyond this typical construct. It is the activity-centered structure that will offer the enabling insights called for in social translucence. When an individual sends an email, they might assume their audience is comprised of the direct distribution list they provided. Rarely do they receive a window into the true distribution network that evolves through forwarded mail or the sharing of artifacts under separate headings. What could a project worker learn if they could see the actual distribution network of their emailed content and artifacts? This very question could be answered if email were enhanced through socially translucent design. I have shown in my research to date, the analytic insights that are possible when these networks are made visible. Using Engeström’s activity system model as a guide, the socially translucent components of email can be assembled and structured to offer the desired translucence. As Erickson and Kellogg state,

“Making knowledge work visible (thus allowing people to observe and contact one another) also enables those who are skilled at unearthing, applying, and adapting knowledge to receive credit for what is all too often an invisible form of work. If knowledge work is made visible it can be recognized and rewarded by the organization (awareness and accountability at the organizational level), and can permit knowledge work to shift from something that takes time away from “real work” to being “real work” in and of itself” (2000, pg.67).

This perfectly describes the development and empowerment my research aims to provide to project work. The data transformation and visualization design that I offer does not make email a socially translucent technology, but it does provide a tool to organize email data in a way that social translucence is achieved through analysis.

Additional research related to social translucence offered a design that supported, “an open and reflective composition of user reputation” in the online community of Wikipedia (McDonald et al., 2009, pg.5). By focusing on the types of work Wikipedians acknowledged and valued through electronic certificates of recognition known as “barnstars,” the authors codified dimensions of user pages and user talk pages, to understand work seen as valuable to the Wikipedia community. The authors provided four issues related to the general designs of socially translucent systems that any designer should keep in mind. The first issue is related to the interpretation of mediated activity.

“Mediated activity is sometimes very discreet and only through repeated observations over time can a set of individual activities be understood as some form of behavior. We do not readily understand the way people perceive and interpret sets of activity as

complex behaviors and how those in turn become characterized as more fully elaborated roles in a community” (McDonald et al., 2009, pg.5).

This is a very pertinent issue to my research as the intended structure planned for the socially translucent design of email is based on mediated activity. Given that this study is oriented toward the project worker where activities are a bit more bound based on the constraints of a specific project, the patterns of activities may be a bit more discoverable. The project structure provides a frame and context by which derived activity systems from email can be compared. It is in the reflective nature of this study where the true benefit resides, as the project worker can reflect on assumptions about their mediated actions. It is the actor herself, who through reflection, can use structured data from email to begin the arduous task of confronting personal and public perceptions of work, related behaviors, and roles within the project community. Who better to reflect, challenge, and learn from the data than the very person responsible for its creation?

The second issue centered on usable reflexive languages.

“Modern text parsing and data mining techniques allow effective means for identifying and selecting individual or groups of activities. Building upon these mining techniques – combined with heuristic models, machine learning, and user attributions – can allow a system to infer and interpret in some thin way what a set of actions by an individual might mean. Those interpretations are only useful when they can be combined and put to use” (McDonald et al., 2009, pg.5).

My research aims to use reflexive languages extracted from email content, structure, and attachments to attempt to structure for the author an interpretation of their meaning. The meaning of course is derived through an aggregation of details and served in an activity-centric structure that can be compared to contextual frames common in project work. The user can then dissect

component details to learn from and even challenge the system interpretation. What better use of aggregated data, than the personal development of its originator?

The third issue calls for effective visualizations.

“There are few examples of easily interpretable visualizations of social behavior...

Individuals fill more than one role at a time and visualizations of activity in a socially mediating technology should be capable of illustrating what actions constitute a given role and how different roles are filled by community members.” (McDonald et al., 2009, pg.5).

Multiple motives and roles within an activity system are a complex issues that Activity Theory struggles to address with consistency, however Engeström’s activity system offers a way to structure and make visible members of a community of practice, the roles being enacted, and the division of labor produced. My data transformation protocol and supporting visualization of email provides mapping for these activity system components, found within the content, structure, and attachments of email. When visualized, the components are easier to interpret. Whether the interpretation of the data by the activity-centric model or the interpretation of visualization by the project worker is correct becomes the very promise of the research. By confronting a visual interpretation one can compare it to known models (project structures or personal mental models) and begin to learn from contradictions and tension that exist between the models.

The fourth and final issue relates to the evolving socially translucent software system and its ability to change in relation to its social context.

“Socially mediating technologies cannot remain static as social processes change around them or they risk being abandoned, as they would no longer serve the needs of their

users. Another open question is how to evolve socially translucence systems to account for new social sensibilities, new actions, and new interpretations of those actions”

(McDonald et al., 2009, pg.5).

This is by far the greatest challenge for designers in general. Although my research has yet to find a full proof solution to this problem, it does leave plenty of room for emerging uses. The frame of my research centers on project workers primarily to help focus interpretations that can be compared to traditional activity-based structures like project charters, sprint boards and user stories. These tools can still be adapted to the general structure of an activity system. Once an activity-centric model of email is derived, the structure of activity itself benefits constant reflection, challenge, and scrutiny so that the very structure of activity can continue to emerge.

6.4 DATA TRANSFORMATION AND VISUALIZATION OF EMAIL

The difficulty of working with email, especially in structuring the data to reveal associations that can support activity-based modeling, has been highlighted in previous work and in my own research. To begin to address these challenges, I provide a data transformation protocol leveraging multiple tools and resulting in an interactive tableau visualization called E.D.A.S. (Email Derived Activity System).

6.4.1 *Transforming Email Data for Activity System Visualization*

To provide researchers an immediate tool to help visualize project work archived in email. I present a data transformation protocol, and a visualization rendered in Tableau called E.D.A.S. (Email Derived Activity System). The work I present in this design highlights many of the complications already encountered through my research and offers structural mitigation to those challenges where possible. The transformation protocol currently requires several third-party

6.4.1.1 Step 1 - Email Identification

The first three steps of the E.D.A.S. data transformation protocol involve the identification of emails to include in the analytic frame, the extraction of images, and the extraction of the email content and metadata. This data transformation protocol currently works with the structures and affordances made available through Microsoft Outlook. The project worker or UX researcher must identify a frame of messages in their SENT folder that correspond to dates when the project of interest was being conducted. The frame can be specific to a PMBOK process group as we have seen throughout my research, or it can be more inclusive to accommodate analysis across multiple PMBOK process groups. Typically, the email frame will be negotiated through filters on dates, keywords in the email subject line, the removal of calendar events, and the removal of any personal or non-work-related contacts and messages. Identifying the frame should involve a certain level of analysis and rigor, but it is important to remember that although the goal of the framing exercise is to be as inclusive as possible, it does not require absolute accuracy. When observing work in person, a researcher is not capable of seeing, identifying, probing, questioning every aspect of work. As a researcher the goal is to be as inclusive as possible to ensure the frame of study is as representative of the work being performed. If certain messages or emails are erroneously omitted from the frame it will not render the analysis useless. It is also important to point out that the initial frame can be as inclusive as choosing all SENT emails during a corresponding project time frame because the visualization might highlight records that shouldn't be included once the data is organized and presented in a structure that allows increased visibility and comparisons of data attributes. The resulting visualization will also allow suppression of records found to be included erroneously. Once the frame of corresponding emails has been identified, the emails should be copied to a unique subfolder so that the project worker or UX researcher has access to the original frame in Outlook should they need to refer to

the original selection. It also makes the export of Outlook data easier to manage when constructing .PST files and the importing process easier when connecting MS Access to Outlook. Once the frame has been identified and a unique folder of associated messages assembled, the extraction process can begin.

6.4.1.2 Step 2 - Extraction of Attachments

As noted throughout my dissertation, attachments in email are central to activity-based analytics. The inclusion of email attachments in research related to email is rare because they are difficult to structure like other email metadata and difficult to organize for assessment while maintaining their association with the email threads that carry them. To overcome these challenges, I employ a desktop application called SysTools Outlook Attachment Extractor. A .PST file of the folder containing the email frame is exported from Outlook and uploaded to the extraction tool. The extraction tool systematically removes all attachments from email and copies them to a desktop folder. The application allows you to append a prefix to the original attachment name. The prefixes are available in various combinations of sender, sent date, and email subject line. By appending email metadata as a prefix to the original file name, it becomes possible to keep the attachment file directly associated with its email and associated content. In my protocol I chose the naming sequence of “from_subject_sent date YYYY-MM-DD_original file name”. Although the extraction tool creates a new folder of attachments that can be placed anywhere on a network drive, it does not provide a file directory needed to associate the files with other data used by the visualization. A batch file process using command line procedures was written to automatically process the attachment folder and provide a hyperlink directory of the files that can then be linked to corresponding email data extracted in the next step of the process.

6.4.1.3 Step 3 - Extraction of Email Metadata

The final step in the data extraction process involves downloading the structural components of email into a database or spreadsheet structure. To accomplish this, I use Microsoft Access to connect and download data from the MS Outlook folder containing the email frame. I should note that when trying to export data directly from MS Outlook to MS Excel, the execution fails to include the sent date, a vital piece of metadata needed for project framing and analysis. Attempting to copy and paste email directly in excel does provide the sent date but fails to copy the content of the message. MS Access not only provides import functionality that connects directly to MS Outlook, but the results of the import process provide all needed metadata fields in a consistent format and order.

6.4.1.4 Step - 4 Transforming Email Data Using Tableau PrepBuilder

The next step in the data transformation protocol involves the actual transformation of the extracted data to both scrub and consolidate the data in a form that is easily interpreted by the visualization software. I provide a high-level overview of the transformation steps that correspond with the sequenced letters in Figure 6.1.

- Step 4A – This step splits apart all the recipients of the email contained in the TO field and creates a separate column of data for each. For example, if a single email had three recipients listed in the TO field, this transformation step would break out the TO column into three columns so that each recipient was assigned a unique space in the structure.
- Step 4B – This step pivots and stacks the data so that each new column representing an individual recipient is assigned a unique row in the data, a format needed by Tableau to properly interpret the data while maintaining its association to all other data elements

- Steps 4C and 4D – These steps are a repeat of steps A and B except they transform any recipients listed in the carbon copy (CC) distribution header. The results of steps 4A-4D ensures that every recipient of an email is represented by a unique row of data.
- Step 4E – Aggregates and cleans the data set to remove any duplicate rows created by the split, pivot, and stacking operations in previous steps.
- Step 4F – Reassembles the data structure after the individual components of step 4E are completed.
- Step 4G - Splits the sent date field into two separate columns, one for the date and the second for the time stamp
- Step 4H – This step cleans and compresses the community list derived from the To and CC distribution headers. Embedded logic within TableauPrep compares multiple pieces of data and aggregates them by resolving differences occurring due to spelling, pronunciation, and common characters. For example, recipients E B Paulson, Brian Paulson, and Paulson (ebpaulson@gmail) are all the same person. This step identifies that these recipients are highly similar and recommends aggregations that can be accepted or denied. This is an important step because a single recipient should be represented by only one name to keep the network associations of the visualization accurate. Any missed associations can be accommodated and cleaned in future steps.
- Step 4I – This step takes the attachment directory established in step 2 of the data extraction process and parses the directory prefix information into sender, receipt date, subject, and file name so that the output file can be married with the email file for rendering in the tableau visualization engine in subsequent steps

- Step 4J – This step creates an aggregate list of all community members derived from the To and CC fields and creates and creates a final list of recipients (representing the project community)
- Step 4K – This step takes the aggregate list created in the previous step and creates an empty column labeled ALIAS, and an empty column called DOL Division of Labor to produce an output file called Community that will be used in subsequent steps.

6.4.1.5 Step 5 - Manual Data Input

As highlighted throughout my research, not all data needed by the activity system can be derived directly through email. Some supporting data is required to make full connections throughout the activity system. Using the Community file created in Step 4K, the project worker or UX researcher can add an alias to any member of the community. This feature can be used to clean up any name issues not accommodated in Step 4H or used to anonymize names as sometime required in this type of research. Secondly, the file provides the ability to assign the Division of Labor per community member. Although a recipient's title (the proxy used throughout my research) can indicate responsibility towards a division of labor. The project worker should be given the opportunity to leverage not only a person's title, but other project documentation as well to help distinguish a more accurate division of labor based on the phase of the project being conducted. The role of a business analyst for example could have very different responsibilities as a project progresses across the PMBOK process groups. As seen in the case study with Gabe, a change in the configuration of a team can demand that an individual step into a division of labor that defies their actual working title. This was seen when Gabe took over PM responsibilities from the outgoing PM in CollabCorp. Gabe's higher-level position meant that

many of the responsibilities of the original PM were divided and assigned to other roles in the community.

In addition to manually updating the community output file, the project worker or UX researcher is provided with a project file. In this spreadsheet, the five PMBOK process groups are listed. The project worker or UX researcher can add begin and end dates for each of the process groups. Those dates will be used to further frame emails to correspond to a process group. If only one process group is identified during the creation of the Outlook frame, then the project worker or UX researcher need only fill in the date range of the email collection and assign it to a process group. Finally, for every process group identified, the project worker is asked to indicate the desired outcome for that process group of work. Changes to all input files are saved to the folder containing all other data sources needed for the visualization.

6.4.1.6 Step-6 Refresh the Tableau Visualization E.D.A.S.

The final step of the process is refreshing the tableau visualization design. E.D.A.S. is configured to read data from the four data sources, the community file, the project file, the email file, and the attachment file. When processed together, an interactive visualization of an activity system derived from a project workers email is available for reflection.

6.4.2 *The Visualization Features of E.D.A.S.*

E.D.A.S. provides several features that allows a project worker or researcher the ability to navigate email components in an associated relationship as articulated by the structure of activity. Each component of the activity system model offers unique insights into aspects of project work, but it is through the networked relationships with other components that one can begin to uncover impacts that might otherwise remain occluded. The activity system architecture

also provides the ability to zoom in or out at different levels of activity depending on the frame of emails included. An example is provided in Figure 6.2.

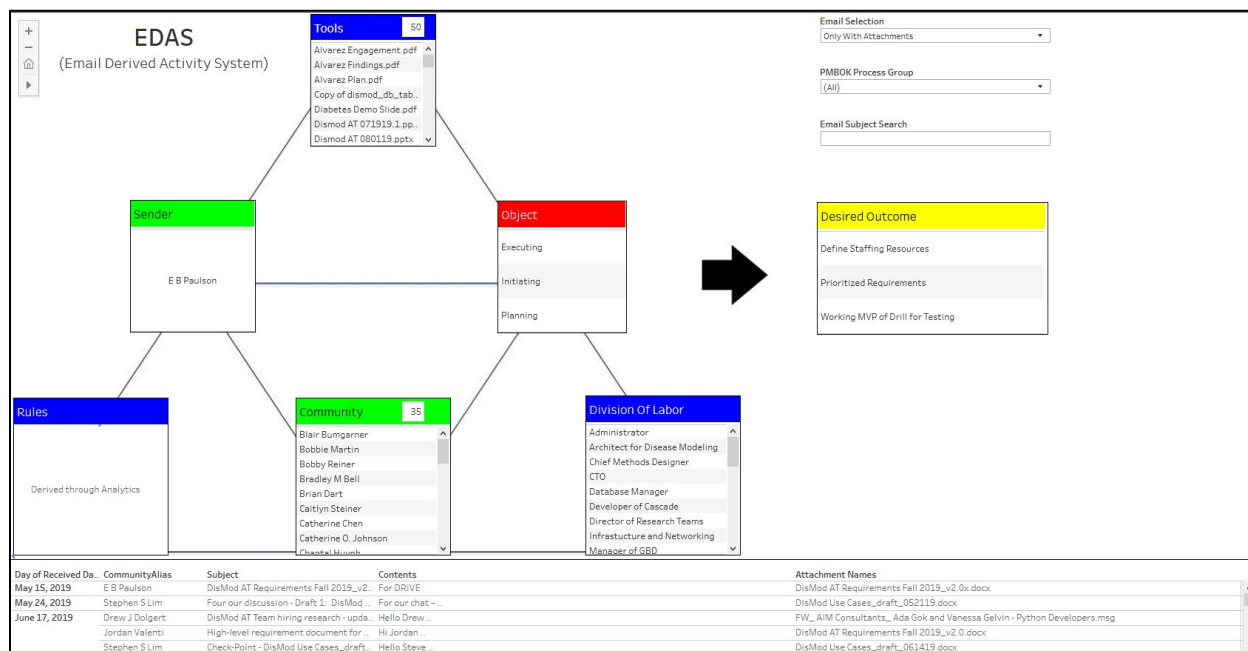


Figure 6.2 Tableau Visualization of an Email Derived Activity System (E.D.A.S.)

6.4.2.1 Tools

The node labeled Tools is a unique list of attachments extracted from email. Several types of attachments are omitted from the visual despite being extracted. This includes things like logos and tiny images that are embedded in signature lines as well as cell phone stamps added to email when messages are processed through a mobile device. Given the small file size I was able to eliminate them from the frame by restricting any file size smaller than 5KB. What remains are legitimate attachments representing project tools leveraged within the project frame. Any tool can be selected or highlighted, and the visualization will reconfigure so that the contents of all other nodes populate based solely on their relationship to the tool selected. Multiple tools can be highlighted at once, again limiting information presented in other nodes to correspond to the

tools selected. This feature supports a zooming functionality that allows both micro and macro forms of analysis throughout the activity system. A count is added to this node to expose the size of the toolset used for a particular project phase.

6.4.2.2 Sender

To mitigate confusion between the human subject of an activity system, and the subject line of an email, the node of Subject in the activity system model was renamed Sender to comply with the structure of email that sources the visualization. The sender is the subject of the activity.

Although the working prototype lists only a single Sender, this is merely a product of one person's sent folder be included in the frame. If the original email frame included multiple Sent folders for multiple individuals, then multiple Senders would be accessible in the node and any individual selection would again limit all other nodes to data directly associated with that selection.

6.4.2.3 Object and Desired Outcome

The nodes for Object and Desired Outcome are not derived from email metadata, but reflect information submitted through the project file identified in Step 5 of the data transformation protocol. The object is populated with any PMBOK process group that has an email corresponding to the date range for that phase of work. If an entire project were represented in the original email frame, all five PMBOK process groups could be available. The worker defines the desired outcome for each process group and that is reflected in in the Desired Outcome node. Adding the capability to address multiple PMBOK process areas within one dataset introduces a temporal component to my work that has not been studied to date. This feature will allow project workers to model and assess the role of mediators like tools (attachments), divisions of labor, rules, and community participation across the phased boundaries of a project. Understanding

how a change in the object of an activity influences the role of mediators, offers increased opportunities for reflection across the lifecycle of a project.

6.4.2.4 Rules

As established throughout my research, rules can be gleaned from project document analysis, especially those created during the planning phase of work; however, they cannot be gleaned directly from email metadata. I chose to leave this blank to encourage deeper levels of analysis to complete it. This field could be added to the project profile if required.

6.4.2.5 Community

The list of community members is comprised of unique recipients of email throughout the frame. They represent both the To and CC distribution headers. Like other nodes, a single individual or assemblage of individuals can be selected to see their specific relationships to other nodes. A micro level form of analysis might involve selecting a single community member to determine which tools they specifically received. When triangulated with the division of labor it becomes possible to determine if a community member was receiving tools that might not be associated with their role on the project, or worse whether they were excluded from communications carrying a tool vital to their role. A count is added to the community box to help indicate the size of the overall community as well as to provide an affordance of exposure when analyzing specific selections in other nodes of the visualization.

6.4.2.6 Division of Labor

This node is populated based on the division of labor articulated by the worker through the project file in Step 5 of the transformation protocol. Each community member is assigned a role, but it is up to the discretion of the worker completing the project profile whether to base that on a

function, title, or job category. Whatever is selected should make categorical sense to the worker conducting the analysis. This node also offers dynamic selection that affects all other nodes.

6.4.2.7 The Data Frame

A data pane is provided below the visualization that presents a familiar email box structure. In the data pane the user can see all the corresponding email metadata like dates, subjects, and body content. The attachment name in the data pane offers a hover over that presents a hyperlink to the actual document so that it can be viewed for analysis. This frame alters based on selection in the visual.

6.4.2.8 The Navigation Filters

To help with search parameters of large datasets, the navigation filters allow the user to limit the data to include only email messages that contain attachments or messages that lack attachments. It also provides a way to limit the data frame by PMBOK process group for instances when several phases of a project are included in the analytic frame. Finally, a search box is provided so that users can maintain a traditional search experience like that found in email folders. The search parameter currently works in association with the email subject text but could easily be extended to include other searchable metadata.

6.5 TESTING OF E.D.A.S. USING A REFLECTIVE DATASET

The data protocol and visualization were tested using an actual dataset of project-based emails provided by Brian, a project worker at University of Washington's International Health Metrics and Evaluation (IHME). Brian manages a design project for a product known as DSMOD-AT, a disease modeling software used for public health research. Brian provided a frame of emails in a .PST file, related to the initiating, planning, and executing process groups of his project. The data

set included 186 unique messages related to the DSMOD-AT project sent by Brian between 5/15/2019 – 12/26/2019. Within the dataset, 65 messages were recorded as having at least one image associated with the email. Brian, a fellow employee at the University of Washington was selected for this study because he had a genuine interest in my research and its ability to help him identify key issues within his project work. As an employee of the same university I was able to obtain and transform his email for analysis without having to navigate the usual barriers involved with corporate non-disclosure agreements and access limitations found in for profit PBOs. Brian had been introducing new agile project management methods to the IHME culture as they transitioned from a traditional waterfall approach to SCRUM. The project had suffered multiple delays, resourcing issues, and scope alterations. Brian was interested in reflecting on his project in the hopes of identifying key issues that might be contributing to the project's troubles while also gaining greater insights into the communication patterns and tools that were supporting or detracting from his transitional goals. My research to this point has leveraged the role of the researcher to use activity system modeling to derive specific contradictions and tensions for discussion and reflection with the project worker. In addition to wanting to get feedback on the usability of E.D.A.S I also wanted to know how accessible the activity system modeling was as a reflective tool without researcher intervention. To test the visualization's ability to stand alone as a structural tool for project workers, I provided Brian with the interactive Tableau visualization of his email set, supplemented with the project defining attributes, like PMBOK process group data ranges and divisions of labor already provided by Brian. In addition, I provided a list of questions to assist Brian on a reflective journey of his project while accessing the reflective affordances provided him through the visualization. The questions and instructions provided were derived from my work in Chapter 4 and highlighted key prompts that one might consider at

various stages of the activity system. The full list of questions, and Brian's written responses, are included in Appendix E. I have extracted several themes related to Brian's assessment of his project using E.D.A.S. and highlighted some usability findings that Brian thinks would improve the tool for reflective exercises.

6.5.1 *Thematic Findings from a Project Worker's Reflective Exercise Using E.D.A.S*

In reviewing Brian's written responses to the reflective exercise involving E.D.A.S and the prompting questions developed during the Enron archival study in Chapter 4, three main themes emerge in Brian's review of his project. They include acknowledgements of personal bias in email communication strategies, cultural insights evidenced in email, and an appreciation of the role of certain tools throughout the project lifecycle.

Evidence of personal bias was acknowledged by Brian when reviewing the interaction between tools and the community of recipients receiving them through email. One colleague and member of the project community was personally difficult to deal with during the project phases analyzed. Brian was able to see evidence in the relationship between tools and community, that he was purposefully excluding this colleague from important emails containing important project attachments. He saw the exclusion grow over time based on the evidence in E.D.A.S but had not made the connection consciously prior to seeing the evidence in the model.

Second, Brian was able to connect certain cultural conditions of his workplace to evidence found in the model. He was able to articulate unspoken rules that governed communication patterns throughout his organization. The first acknowledgement was that the senior stakeholder on his project wields absolute power over design decisions and has a notable history of judging and disparaging half-backed thoughts or emerging ideas put into writing.

This was manifested through the data in a couple of ways. First, there was a notable absence in emailed communications to the senior stakeholder despite his required review over design. This tracked to the senior stakeholder's preference for weekly status meetings, and developer's and designer's unwillingness to put anything in writing before a concept was fully flushed out for discussion in a meeting. A fear of public scrutiny and even retribution led to decisions within the PBO to document as much as possible in media formats that were harder to share and access so that a safety space of design and development could occur. In addition, the cultural rules of power and position reigned strong throughout the project as evidenced once again in the communication patterns visible through the activity model. Brian realized that important status documents conveying critical design decisions were only routed and shared with senior management. This was a cultural expectation. In fact, Brian was specifically instructed not to talk to academic modelers responsible for generating product requirements, despite their critical role in conveying important design concepts for the evolution of the project. There was a cultural expectation that he communicate up, but not down, and that the leaders receiving his communications would disseminate the information to their employees as needed. This cultural constraint revealed that developers and designers were denied timely and important updates communicated through emailed artifacts as leaders rarely lived up to their end of the cultural bargain, failing to inform those who needed the information most. This led to extreme mismatches between documents converting decision and status and source applications used to maintain requirements for development.

Finally, Brian was able to reflect on the mediating properties of key tools used to convey status throughout his project. He noticed a lack of convention to naming his status files, a decision that caused increased confusion among his distribution channels. In attempting to

review the impact of files on certain divisions of labor, he realized the random naming conventions used prevented him from easily comparing similar files and their intended functions. As a result, he has adopted a new labeling methodology to bring better organization to his artifacts to make them more visible for analysis. Closely related, but a unique insight on its own, Brian was able to derive another important insight related to tools within his PBO that could impact future project communication strategies. He noticed that the Business Requirement Document was a central document used during the planning phase of his project to reach consensus on important phases of development. However, a tool so critical to the planning phase largely disappeared from emails during the executions phase, because the management of requirements were moved into an enterprise project management tool (Jira). This limited access and scrutiny to requirements that was prevalent in the BRD, consistent with the cultural findings discussed previously. As he reset his project due to substantial turnover, the project was taken out of execution and returned to planning. The BRD once again became a central organizing document but remained divorced from the enterprise project management source creating even more confusion in requirement development. He discovered a true appreciation for the power of tools to mediate project activity and keep the collaborative community informed. Learning from the exposed relationships between tools, the project community, and divisions of labor Brian was able to grow through a deeper understanding of cultural impacts and mediating rules that go unspoken daily. He was able to leverage information from the reflective experience to derive new thoughts on working within his PBO to navigate disruptive cultural patterns. He was able to design new methods aimed at improving communication on future projects and grew in his appreciation for things as simple as naming conventions that can have impacts on information processing and subsequent

abilities to analyze that information. The developmental potential of reflecting through an activity system structure, especially when used to model workplace communication technologies like email, was realized by a project worker currently engaged in a complicated design project.

6.6 CONCLUSION

The objective of my design was to two-fold. I wanted to find an immediate design that could help researchers avoid the labor intensive and time-consuming experiences I encountered working with email during the research for my dissertation. Secondly, I wanted the design to be flexible enough to inform requirements for a self-contained application that could be used by any project worker using MS Outlook as their professional mail client. Designing the data transformation protocol highlights all the steps an application would need to accommodate to render the visual design

As designed, the data transformation protocol and resulting visualization provide a transformative opportunity for project workers to interact with email and attachments in a new way. Structured through an activity system model, the relationships between the mediating aspect of email and even the presence or absence of expected components, allows a project worker to reflect on their project experience while identifying specific empirical examples of artifacts and communication strategies that can be improved or altered to achieve efficiencies in active and future projects. In a single test of the structure, empirical insights related to personal communication choices, the influence of an organization's leadership, the cultural aspects of the PBO, and advantages and limitations of specific project artifacts were able to be assessed, used for reflective purposes, and generated ideas for improvement opportunities.

6.6.1 *Limitations of Current Design*

As has already been acknowledged, the data transformation protocol and resulting visualization have significant limitations, some merely a product of the early stages of the design, while others a product of PIM practices within email itself. The current design is dependent on too many disparate tools pieced together to achieve the final result. The current design does not allow easy processing of multiple .PST files which can make aggregate analysis difficult. However, if one were to model an email frame within MS Outlook so that a single .PST file can be created, this limitation could be mitigated. The current protocol requires additional data input beyond that offered through email (specifically rules and division of labor) and some pre-work by the project worker in defining the MS Outlook data file. This process is a bit disjointed in the transformation protocol, but again is something that could be mitigated or better facilitated in a self-contained application. The design currently requires interaction with a UX communications specialist or researcher to help facilitate the protocol of identifying a project frame and preparing it for assessment. Should the workflow be accommodated by a self-contained application, the project worker would be able to review their own material without assistance if necessary.

Physical limitations of the visual design left the user wanting more control over the interactivity with the data. Although certain affordances like sorting, search, data suppression and isolation, state reverts, and data downloads are available in the current design, they are largely expressed through the design constraints of Tableau and could be made more usable and accessible in the design of a self-contained application. It was also noted that expanding the organizing capability of the object beyond the PMBOK process groups to map more specifically to phases in the software development lifecycle would be beneficial for projects dealing with technical design.

6.6.2 *Limitations of Email Due to Personal Information Management Practices*

The data transformation protocol, visualization, and even a future self-contained application will need to continually adapt to emerging issues related to the personal management of information in email. Individual folder structures, email threading patterns, use of categories, use of flags and notifications, use of embedded links to documentations, and naming patterns used in attachments, can all impact the proper assembly of the visualization. The inclusion of legalese limiting the access and use of certain email content is a growing concern. These are just a few examples that show how personal use of email's structure can introduce challenges to the restructuring of email for routine analytic purposes. This also highlights that the body of the email, currently omitted from major points of analysis, but included for context, is a tool in of itself that should be considered in future activity-based assessments. Introducing additional forms of content analysis on the body of the email could highlight even more information to be used during the reflective activity. The current design affords access to the content for analysis but does not automatically expose the content to the structuring affordances of the activity system model. Addressing links to documents embedded in the body content is of most importance in future designs as more and more individuals are choosing to embed links to documents residing on servers, content management systems, and even enterprise project management applications. Users increasingly want to avoid requirements getting lost in the body of email and seek ways to link a reader back to a source that can be updated for greater collaboration control. Other problematic features in the body of email, like the inclusion of signature line logos and mobile phone tag images, were addressed and mitigated in my design based on their small file size. Embedded attachments or images in the body of the email can cause issues when attempting to extract artifacts from email in general. I chose to suppress any

file size smaller than 5KB. This mitigated the problem in the dataset analyzed during testing but might not hold for other datasets that run through the transformation protocol. Despite these limitations, the protocol and visualization were shown to be both useful and transformative by a single project worker using it to analyze previous phases of work in an active and ongoing design project.

6.6.3 *Future Design Work*

To scale the benefits of the current data transformation protocol and visualization in a manner that would allow an individual project worker the ability to process and reflect on their own email, I plan to create design and create a self-contained application. A self-contained application would offer many benefits. The design would leverage the workflow steps of the data transformation protocol and eliminate the need for multiple applications by accommodating their individual functions in unifying code. It would make the workflow of transforming and supplementing email data more visible, allowing the user to make design decisions during the development of the final dataset. The resulting visualization could provide increased opportunity for data manipulation and scenario building, giving the user more analytical power throughout their reflection and discovery. A self-contained application would also help bridge the difficulty that current work researchers have in attempting to gain access to workplace email for analysis purposes, giving the project worker greater control over the inclusion and exclusion criteria. Finally, a self-contained application could offer options for a project worker to identify key planning documents like charters, statements of work, and RACI matrices, and help establish key connections to defined rules and divisions or labor articulated within them. In addition, an application could leverage APIs and other technical means of connecting disparate data sources, and tool repositories like SharePoint, wikis, or even project management applications responsible

for managing the source of requirements as they evolve over time. Artifacts and integrations could be leveraged directly, or the application could offer standalone capability for the project worker to define projects within the application. A project profile established within the application could be used to tag email during its creation, if properly integrated with the ribbon of control in an email client like MS Outlook. A formal application design would improve the usability and the scalability needed to overcome both personal management of email data and some of the organizational constraints imposed on technologies during cross functional project work.

Chapter 7. REVIEW OF CONTRIBUTIONS AND FUTURE WORK

The final chapter of my dissertation looks at my original research questions and highlights themes of resulting contributions to the analysis of project work. I document known limitations to my research throughout and offer a trajectory for future research.

7.1 DISCUSSION OF THEMATIC FINDINGS AND CONTRIBUTIONS

The research presented in this dissertation represents an evolution of ideas centered on a desire to make project work visible for activity-based modeling and subsequent reflection. The empirical observation of episodic project work is difficult, if not elusive, when the collaborative work is spread across organizations or has ended with the close of a project and the disbandment of the project team. The individual project workers of a PBO often remain available as project resources for subsequent projects. Contradictions and tensions plaguing one project can easily manifest themselves in future projects if left unresolved. Making these contradictions visible through a common structure allows project professionals the ability to reflect, learn, and grow as employees and contributors to future projects. A common structure like the activity system model allows multiple project workers to assess their individual contributions through specific identifiable characteristics of project activity, compare a common frame of project work against similarly modeled experiences of other project team members, and offers the potential to enable the aggregate individual findings into larger networks of activity systems to identify contradictions and tensions on a macro scale of collaboration.

7.1.1 *Advancing Capabilities of Activity Theory for Project Work Analysis*

My research has shown that email is a powerful resource for analyzing project work activity. Making email visible through an activity-based structure allows one to reflect on the

interdependencies of the mediating components, those that are discoverable in email, and those that are purposefully or accidentally omitted. The presence or absence of mediating tools can lead to transformative insights into the communication patterns of a project-based organization. My work adds additional capability to the use of Activity Theory and activity system modeling for work analysis by enabling structured empirical insights into episodic work.

RQ1 - What components of an individual's email can be used to inform and develop activity system models allowing reflective capability for project work?

I have shown through three different studies; an archival analysis of an Enron project worker, a case study of a project worker navigating a multi-organizational design project with varying levels of power dynamics existing among the collaborating organizations, and a project worker's reflection on previous phases of an active project using E.D.A.S, that the structure of email can be leveraged to complete an activity system model, making visible the mediating aspects of project work. In all three studies, the components of email used to develop activity system models have remained consistent. Certain components have been operationalized to bring uniformity to this type of assessment. The individual reflective project worker is always the subject and sender of emails. The project worker's SENT folder provides the frame. The PMBOK process areas bind the object of analysis to particular phases of project work, defined by project milestone dates. The desired outcome is always a product of the phase of work being analyzed. Email attachments are extracted to show a portfolio of project tools distributed via email during phases of project work. The community is derived from email's distribution headers representing the TO and CC lines.

RQ2 - What components of the activity system are left underdeveloped through an analysis of email alone?

The mediating components of *Rules* and *Division of Labor* are not directly populated by specific metadata available through email; however, email contains traces of evidence that can be used to support the identification of these activity system components. The division of labor can be informed through the working titles of the community members often available in the signature lines of email. As research showed in the case of Gabe, one must be careful in assuming that working titles represent project-based responsibilities. As the nuances of a project grow and the resources dedicated to a project change over time, so to can the appropriated division of labor. In Brian's testing of E.D.A.S, he offered a design recommendation to align the division of labor with a project RACI matrix (responsible, accountable, consulted, informed) as it does a better job than working titles in delineating specific criteria for the division of labor as it pertains to artifacts found in email. This component of the activity system model remains available for the project worker to define so that it relates specifically to their project work.

The hidden or unspoken *Rules* of the activity system model, typically representing key aspects of the PBO culture, are often discovered by exploring the relationships of other mediating components. In the case of Gabe's design project for CollabCorp, several rules related to workflow and communication sequencing were found substantiated in email attachments and were clearly articulated as part of the central project document assembled by the exiting project manager. Brian was able to glean important insights about his PBO culture by evidence in the inclusion or exclusion of certain community members when circulating key artifacts through email. Although *Rules* and *Division of Labor* are not populated directly, other supporting features within email, and the associations made visible through an activity system structure,

allows the project worker to draw conclusion or at the very least develop informed insights into these two important mediating components.

7.1.2 *Opportunity for Internal UX Specialists to Assist with Project Work Analysis*

As noted throughout my dissertation, project work is mediated by a large set of custom tools and artifacts. These artifacts help bridge the boundaries between collaborating organizations and fill the operational gaps left behind by enterprise project management applications. Custom documents, spreadsheets, presentations, images, and templates create a bricolage of resources representing both individual human contributions to work and cultural appropriations of rules and expectations. Expertise in communication practices, document analysis, usability, and design readily found in various UX roles dedicated to improving customer facing products should be turned inward in support of more efficient processes and tools to support project work. Although a project worker can use the methods developed through this research to reflect on their own work, as demonstrated by Brian's testing of E.D.A.S., rarely do practicing project professionals have the time to conduct this level analysis while actively engaged in project work. This was something that Gabe clearly articulated in his reflective review of ProjectWeb. Improving the project-based conditions necessary to develop consumer products should be just as important if not more important than focusing on consumer usability issues. Protecting and growing the project resources that deliver consumer products will inevitably be reflected in resulting product designs. Also, project professionals are not always trained in the art of analysis nor would their personal assessments be easily aggregated for collective level insights without the guidance and support of research roles dedicated to constantly improving the project experience. Finally, the power dynamics involved in project work could be navigated more carefully with the expertise of a neutral party to the project, something a UX specialist or researcher could provide.

RQ3 - What types of questions develop during the modeling exercise that would assist in the reflection process?

Leveraging work from my archival analysis of the Enron corpus led to a series of questions that a researcher might ask when analyzing an activity system derived from email. These questions were recycled and used as prompts in Brian's reflective exploration using E.D.A.S. The questions were organized in a manner that corresponded to mediating nodes of the activity system model. With no background in activity theory, Brian was able to leverage these prompting questions and the activity-based visual of his email to draw impressive insights into his personal work behaviors as well as his PBO culture. More testing needs to be done to substantiate the value of the prompting questions, but this initial test shows tremendous opportunity in making Activity Theory supported structures accessible to project workers without direct support from trained researchers.

One might ask why I promote the usability and understanding of the activity system modeling experience direct with project employees while simultaneously promoting the inclusion of internal UX researchers for project work analysis. The answer is simple. Email remains a very personal repository of information. Workers blend personal and professional communications in a single tool. The repository also houses sensitive company information, design insights, legal communications, communications from clients, and communications with vendors. Attempting to research email as an outsider to an organization, I was routinely denied access to corporate email even when agreeing to sign a non-disclosure agreement. Having a trusted researcher as a member of an organization's project team is highly preferable, but in their absence a project

worker should not be denied the tools and methods shown to make their work more visible for reflection and analysis.

RQ4 - What skills would be required on behalf of the analyst conducting this work to develop the reflective models?

Throughout my dissertation I have highlighted key skills necessary to derive insights into project work. Skills in document analysis, interviews, visual modeling, content analysis, workflow analysis, design, usability assessments, and of course activity system modeling are just a few of the skills needed to support analysis of project work. The development of a supporting application for project email analysis could make many of the analytic routines standard for improved usability among project workers, but being able to connect findings to other forms of data extraction is important in order to get as full of a picture as possible related to project work. Remember it is not just what *is* included in the analytic frame provided by email that is important to reflective findings, but what *is not* included can also be of paramount importance. Trained UX researchers should be more than capable of helping connect these disparate sources of information. It is important to note that although my research identifies an opportunity for skilled analysts and researchers, they are not required for an individual worker to leverage the methodology for reflective insights. An individual project worker could easily find reflective advantages on their own, especially if aided with technology that efficiently organizes email data and makes the data more translucent.

RQ5 – Is the data derived from email capable of generating an activity system model comparable to models derived from other data extraction methods like interviews and document analysis?

Using email to support the activity-centered modeling of project work has shown tremendous capability in exposing specific work practices of individual project workers and cultural characteristics of their PBO. Chapter 5 leveraged comparable data extraction methods to support the development of activity system models. The email method I developed not only surfaced more insights than the reflective interview or the central document analysis, but it provided empirical evidence of actual communicative acts initiated by the project worker being analyzed. This made the findings more personal and relatable. Most importantly it provided very specific examples of mediating attachments and the communicative practices that carry them throughout the project ecosystem. As contradictions and tensions are identified, their relationship to specific mediators provide an immediate opportunity to identify a specific change or mitigation strategy capable of improving the efficiency of the activity. The identification of precise tools that can be improved, giving voice to social and cultural conditions, identifying systemic issues in the division of labor; these are all possible scenarios that can rapidly improve project efficiencies.

7.1.3 *Empowering the Project Worker in an Inconsistent Work Environment*

The ultimate goal of my research was to find reliable and routine methods, like those found in more routine work practices, to support project worker development despite the complexity and fragmentation inherent in their professions. The episodic nature of project work provides barriers to traditional work assessments and professional development for many of the reasons listed through this dissertation including but not limited to the variations in tools, the fluidity of project resources assigned to a project throughout its lifecycle, and the variations in methods used across projects.

RQ6 – How does the worker’s project methodology impact assumptions about how email supports project-based analytics?

Although touched on in each study of a project professional, the choice of methods was not discussed in detail. The primary concern during my research was to determine whether the PMBOK process groups were identifiable enough to use as binding agents of the projects’ objective. In the limited cases encountered, the process groups were recognizable and did not cause any issues. Exact framing using this construct showed some signs of weakness when assessing Gabe’s collaborative project. Findings showed that CollabCorp and DevTech used very separate design methods, with DevTech operating through a waterfall approach and CollabCorp using iterative agile sprints. This difference in method caused sequencing issues in the actual work, but because the analysis was framed from a single user’s perspective (Gabe) the PMBOK structure was still supportive. It also helped that the execution process group was easily applied to agile methods since it encompasses iterative design processes. Had the object of study focused on the planning phase which aligns more readily with waterfall approaches some framing issues could have been discovered. Brian’s work, although agile and iterative during the execution phase, was indicative of “scrummerfall” a term used in project circles to describe an organization that can’t shed its allegiance to heavy upfront documentation and planning found in the waterfall method, despite adopting SCRUM as the method for iterative development. This allowed Brian to easily navigate between a more traditional waterfall planning phase and an interactive execution phase. Although the PMBOK provides a widely recognizable construct, any frame that is understood by all members of the extended project community can be leveraged. The most important factor is providing a uniform project frame for the project community so that the analytic frame remains consistent.

RQ7 – What new insights does a working project professional gain by reflecting on email data organized by an activity system model?

My research has provided several examples of insights gained through reflection supported by email derived activity systems. Gabe realized the importance of level setting role expectations during transitions of project resources and keeping strict control over project status documents to prevent scope creep. He was able to identify specific documented rules that were not routinely enforced throughout the project governance structure. Brian discovered personal communication biases preventing key project members from obtaining critical project documentation, found specific evidence that supported cultural power dimensions related to the senior stakeholder that quietly impacted moral and work, and noted improvements that could be made to future naming conventions for emailed artifacts that would promote increased awareness and analytic capabilities. Two active project workers were changed for the better through reflective engagements of their own email structured through the lens of Activity Theory. This alone makes my research personally rewarding and shows its promise if adopted throughout project-based organizations.

7.1.4 Requirements for an Application to Support Project Work Analysis

The work conducted throughout my dissertation has provided experiences and insights needed to construct a single tool to support an individual project worker's reflection on episodic project work. Hoping to provide a tool that can make project work more visible for analysis while highlighting exact and specific mediators that can be altered to gain improvements in efficiency was a desired goal of my work to date.

RQ8 – What design accommodations can be made to support the reflective analysis of email for project workers?

Although not a complete application, the data transformation protocol and resulting visualization provides the basic requirements for application development. Key features and processes have been identified and shown to produce effective reflective capability. The protocol and visualization can be used immediately by any researcher or project worker with a little technical organization and acquisition of related tools. The actual development and testing of an application would be the goal of future work.

7.2 FUTURE WORK

Beyond the development of a self-contained application, further work is needed to expand the analysis of a single project worker to a more macro level frame that assess multiple project workers collaborating on the same project. Research that would allow email assessments of multiple collaborating organizations could open the defined methodology to include multiple activity systems as highlighted in Engeström's examples of "knot-working."

Although some limitations of the structure of email were overcome through my work, many remain to be addressed and new ones emerge daily as email becomes increasingly appropriated for personal and professional use. Research with increasingly complicated email examples would begin to form a more cohesive approach to modeling and could inspire changes in the use of workplace email.

Additional research on the impacts of comparing mediators across project phases (objects of activity) is also needed. Brian's reflection using E.D.A.S identified several issues that evolved over time because he was able to compare the role of the same mediator for different activity objects (project phases) across the first three phases of the project lifecycle. Not all mediators

persist across phases of a project, but those that do could lead to increased contradictions if their role changes between phases to meet a new objective.

To increase the transferability of this qualitative research, additional work should be conducted in a manner that widens the demographic inclusivity of the subject pool. The research conducted to date has only reflected the perspective of white male American project workers. This was merely a product of convenience sampling as my intention was never to exclude diverse perspectives. Including perspectives from project workers of different races, genders, nationalities, and cultural backgrounds would only serve to enhance the findings and their applicability across many scenarios and situations of project work.

A comprehensive study of a multi-organizational project over time could highlight the ability of my devised method to help routinely monitor a project for emerging contradictions and determine its capability in assisting targeted mitigations to improve project work efficiency. Demonstrating such capability could go a long way in supporting the adoption of UX professionals for internal work analysis.

Finally, more work needs to be conducted to understand email's role in bridging organizations during project work. Knowing that enterprise project management tools currently lack cross-boundary communication affordances and features, email could be leveraged as a recognizable and widely used tool in support of integrative design features. It may even call for specific project affordances to be accommodated within the design of major workplace email clients like MS Outlook. Though there is much work left to do, and many project scenarios left to explore, my research has provided an immediate way to make episodic project work visible for reflection.

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APPENDIX A – STUDY ANNOUNCEMENT

Empowering Individual Project Workers through Reflections of Activity-based Analytics

Research Study Announcement

As part of my doctoral research at the University of Washington's department of Human Centered Design and Engineering, I am conducting on site interviews with project workers to inform the design of reflective tools meant to help improve their project-based communications. This study will contribute to theoretical frameworks that help define how a project worker's communications, use of digital artifacts, and understanding of their project community enhance or limit project-based collaborations.

The study will consist of three parts. First, each participant will take part in an interview about a recent phase of a project with which they were involved. During this one-hour interview, the participant will be provided an activity-based framework to document their experiences and reflect on areas of potential improvement. Second, the participant will be asked to provide the interviewer with a copy of project related emails they sent during the phase of the project being discussed. The interviewer will assist with the collection of emails. Copies of other tools used in the project such as digital archives, technical applications, spreadsheets, models, etc. may also be requested. The interviewer will study the collected emails, artifacts, content, attachments, and metadata to produce another activity-based assessment. Finally, the interviewer will meet with the participant a final time to review findings from the email assessment and compare that information with information collected during the initial interview.

The study will provide all participants with a technique to reflect on their project work, offer a standard vocabulary through which they can compare their work with other members of their

project team, and highlight areas where project work may be improved within their organization. Information collected during this study will inform the various ways email and digital attachments can be analyzed to offer reflective insights about projects. This information will inform the design of a computer application that offers project workers a tool to routinely analyze email history and produce visual activity assessments capable of highlighting areas where project work may be improved.

Participation criteria:

1. You are an employed professional whose work is routinely focused on projects and have served in a project related role (regardless of industry) for more than 5 years
2. You use email as one tool to facilitate your project related work
3. You can participate in an initial 1-hour interview about your project related work
4. You can provide a sample of emails and work products that support your project work
5. You can participate in a second 1-hour interview to review findings from your email

If you meet the stated criteria and would be willing to engage in an onsite interview at your place of employment, please notify me at the rddivine@uw.edu to arrange an appointment.

Sincerely,

Richard Douglas Divine

PhD Candidate, Human Centered Design & Engineering

University of Washington

APPENDIX B – STUDY CONSENT FORM

Empowering Individual Project Workers through Reflections of Activity-based Analytics

Study Participation Consent Form

Richard Douglas Divine

University of Washington, Human Centered Design & Engineering

rddivine@uw.edu

You have been invited to take part in a research study of project professionals and their use of email as a tool to facilitate project work.

What the study is about: This study will inform the design of reflective tools meant to help improve project-based communications, and to determine whether email can be used as a reflective tool to increase understanding and communications about projects. This study will contribute to theoretical frameworks that help define how a project worker's communications, use of digital artifacts, and understanding of their project community enhance or limit project-based collaborations.

What you will be asked to do: Over the span of two 1-hour interviews you will be asked a series of questions meant to prompt discussion of your experiences as a project professional. The sessions will be recorded with an audio recorder so that I can focus on your responses and refer to the record as I prepare the data. We will spend most of our time discussing the tools you use to facilitate project work, with a specific interest in the use of email. You will be asked to provide a

time series sample of work emails that pertain to topics surfaced during the interview. I will assist in the process of copying and securing your sample emails.

Risks and benefits: There are no anticipated risks to you if you participate in this study, beyond those encountered in everyday life. Information collected during this study will be used to inform the design of reflective tools meant to help project workers identify potential areas of contradictions during the project lifecycle. As a direct benefit, you will be presented with an analysis of collected materials that may provide new insights to your own project work.

Taking part is voluntary: Taking part in this study is completely voluntary. If you choose to be in the study, you can withdraw at any time without consequences of any kind. You can choose to decline to answer any question asked during the interview. You may decline to provide samples that may be requested during the session. Participating in this study does not mean that you are giving up any of your legal rights.

Your answers will be confidential: The records of this study will be kept private. All audio, data, email, and work samples will be anonymized and stored on a private and secure server. Any connections to your identity and material will be maintained in a separately stored file kept separate from the server. Once the data is assembled, the connection to your identity will be destroyed. Any report of this research that is made available to the public will not include your name or any other individual information by which you could be identified.

If you have questions or want a copy or summary of the study results: Contact the researcher at the email address or phone number above. You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information and have received answers to any questions. I affirm that I am 18 years of age or older. I consent to take part in the research study as described.

Participant's Signature

Date

APPENDIX C – SEMI-STRUCTURED INTERVIEW SCRIPT

Initial Interview Protocol

The aim of my research is to investigate the way project workers use email during project work, and to determine whether digital artifacts (attachments) contained in email can be used as reflective tools to increase understanding and communications about particular projects. My hope is to contribute to theoretical frameworks that help us understand how your interactions, use of tools, and understanding / expectations of your project rules and community contribute to or distract from your abilities to successfully meet your goals. This information will help in my attempt to design tools that help facilitate project work, while at the same time help capture social details that make the work possible or the details that are disrupting the work. I will focus on the tools that you use to do your project work, technology, spreadsheets, models, email, and even knowledge or ideas that you use that might not be written down anywhere. I am also interested in your candid feedback about the team members and stakeholders that you interact with during the course of your work. Feel free to be as open and honest about your thoughts on teammates, as this is critical to the research. Please do not be worried that your information will be used against you in any way. The information will remain anonymous and I will review collected information with you so that you can help me identify any worries you may have about how your responses are presented. This is a partnership and I want to make sure that your views and opinions are adequately captured, and that I am not putting words in your mouth. I will also be recording this interview unless you have strong objections. I am willing to stop recording at any point you feel uncomfortable. The recordings will allow me to focus more on you and support my analysis in the future. I will also be taking notes during the process. This will be a semi-structured interview, meaning I have a series of questions that I am interested in, but will

likely generate follow-up questions based on our discussion. I want this to be as conversational as possible. Does this sound agreeable?

Awesome – let us get started.

So, the general agenda of the interview will involve the following”

1. General term overview
2. General information collection about your role, your projects, your project teams, and your organization
3. Specific focus on a recent project that might not have gone as well as you may have hoped (a particular phase of the project to be exact)
 - a. A series of specific questions to help develop an AT model of your project phase
 - b. Review of any document repositories
 - c. Collection of any digital artifacts or tools that you used during the identified phase of the project
 - d. Collection of work email corresponding to the dates to the project phase
 - e. Review of email related to the project phase discussed

Overview

1. I use many terms when I conduct these interviews and I want to make sure that we have the same understanding. To begin, I would like to go through the following terms and describe what I mean by them. If there is a more suitable term that matches the way you refer to the concepts in your job let me know and we will use that term instead. Deal?
 - a. Activity / Task – A specific work activity – in this case a specific phase of project work
 - i. Interviewee preference -

- b. Tool / Artifact – anything that you may use to help facilitate you work (especially email digital work samples and emailed attachments)
 - i. Interviewee preference -
- c. Subject – the person of interest when examining a work task or activity
 - i. Interviewee preference -
- d. Object – the goal or intent behind a project-based activity – in this study this often equates to a phase of a project
 - i. Interviewee preference -
- e. Community / Organization – the larger work community engaged in a specific task or activity
 - i. Interviewee preference -
- f. Rules – the explicit or implicit rules that govern the relationship between the subject and their work community when collectively engaged in a work task or activity
 - i. Interviewee preference -
- g. Division of labor – the various roles or duties assigned to each member of the work community in completing a task or activity
 - i. Interviewee preference -
- h. Roles – project specific assignments that distinguish work responsibilities across the project community when examining an activity or task
 - i. Interviewee preference -
- i. Supervisor – the lead coordinating role(s) for a given activity / task
 - i. Interviewee preference -

- j. Stakeholder – interested members of the project community that may not have an active role in the project activity or task
 - i. Interviewee preference –
- 2. Overview of the AT model – handout
 - a. Does anything about this model seem confusing?
 - i. Interviewee feedback -

General Questions

- 3. To start, can you share a little about yourself and your role in the organization?
 - a. How long have you worked here?
 - b. What is your educational background?
 - c. What is your work experience?
 - d. Are you certified in Business Analysis / Project Management (CBAP / PMP)?
- 4. Are you familiar with the PMBOK? If so, how aligned is your company's project work with PMBOK recommended methodologies?
- 5. Do you prefer agile or waterfall methodologies? – What is practiced here?
- 6. If I were to ask you to breakdown the phases of a given project at your company, what phases would you list?
- 7. Do you have any methodologies or tools that you might consider unique to your work environment or your project community?
- 8. Do you routinely work with third parties (external to your company) when facilitating project work? If so, tell me about them.

Project Specific Questions – Goal is to complete and AT Model for Analytic Comparison

9. Can you recall a recent project (within the past year) which you or other project community members found difficult or challenging?
 - a. What is the project?
 - b. How long was it in process?
 - c. What was your role(s) on this project?
 - d. How many tasks were you personally responsible for?
 - e. To whom did you report as it relates to this project?
 - f. What were some challenging experiences related to this project?
 - g. Do you prefer this project over other projects you have worked on here?
10. What was the most challenging phase of this project?
11. Can you describe for me the standard tools you used to help facilitate work on this phase of the project?
 - a. Things created (spreadsheets, docs, graphs, etc.)
 - b. Things used (tools, systems, applications, guiderails)
 - c. Standard knowledge with the “way things work around here”
12. Can you list the people who were working on your project team during this phase, and what their roles were?
 - a. How many of these people do you see on a daily basis?
 - b. How many do you talk to / email on a daily basis?
 - c. Are there any members that you depend on heavily to accomplish your goals?
 - d. Are there any members that you wish you didn't have to rely on? Why is that?
 - e. Do you have a favorite person to work with? Why?

13. How many of the people listed have you worked with on other projects?
- Is there someone you used to work with that is no longer on this project that you wish you had back?
 - What did this person do during the last project that helped your work?
14. Can you tell me about any basic ground rules that one must follow to be considered a contributing member of your project community? Are there any rules that you require of third party participants? Are there any things that would be strictly forbidden?
- (Communication rules, dress code, etiquette, participation, hours)
- Implicit –
 - Explicit –
15. What is the biggest obstacle to getting your work accomplished?
- Person?
 - Tool?
 - Rules?
 - Work environment / atmosphere?
16. If you had to pick one tool or piece of knowledge that you couldn't do your job without, what would it be?
- Can I have a sample / screenshot / etc.?
 - Can you show me or describe to me how you use it?
 - Why is it essential?
 - Do others depend on this tool? Who? How?
17. Is there a tool that you find to be distracting or disruptive to your work?
- Do you use it? Why or why not?

- b. What would you use instead?
18. (Optional): Other team members have provided some of the following documents related to the project. Can you tell me whether you use them? How do you use them? What do you like/dislike about them?
19. Has anything that we discussed today, raised thoughts about how you currently work?
- a. Did you make any discoveries about the role of tools in your work?
 - b. Did you discover anything interesting about how you view your role?
 - c. Did you discover anything interesting about your teammates / working environment?
 - d. If you could change anything about your work as a result of our conversation, what would it be?
20. So, is there anything else that I should know about your work?
21. What other questions do you think I should ask (of you or other team members?)
22. Do you maintain a digital library (SharePoint Site, Jira, etc.) of digital artifacts or tools created to facilitate your project work?
- a. If so, can I get a copy of any digital artifact related to the project phase we discussed?
 - b. I would also like to know the file name of the digital artifact if possible.
23. An important part of my assessment requires me to analyze email content related to the specific phase of the project that we discussed today. Can I take a copy of emails you sent and received during the phase of the project we discussed? These emails will remain secure and confidential and I will only be using emails pertaining to the project we discussed in my analysis. Although I may come across personal emails during my

analysis if they do not pertain to the project, I will not spend time reading or assessing them in any way. I know this requires a significant amount of trust and I can guarantee that you will have the opportunity to review any information elicited as part of this analysis.

24. I will be using information obtained through the analysis of your email to generate another AT model. I would very much like to set up a one hour follow-up session where we can discuss the model we generated today and how it compares to the model generated through an analysis of your email. The differences between these models (known as contradictions) should offer interesting insights and an opportunity for you to reflect on problem areas associated with your project.

25. Do you have any questions for me?

Thank you so much for taking the time to meet with me and letting me be a part of your work for the day. In the coming days I would like to share some of my memos with you to make sure I captured your thoughts and experiences as best I could. If there is anything more you would like to share about our talk today, feel free to email me or schedule a time to talk. In terms of next steps, I will reach out to you when I complete my analysis of your email to schedule a time for the two of us to review my findings and reflect on the process as whole. Thanks again for your participation!

APPENDIX D –INTERVIEW TRANSCRIPT

Transcription details:

Date: 04-Jan-2020
 Input sound file: GB_10282019_Session1.mp3

Transcription results:

S1: 00:02 Okay. All right. So I'm just going to read some verbiage here. So the aim of my research is to investigate the way project workers use email during project work and determine whether digital artifacts, also known as attachments, contained in email can be used as reflective tools to increase understanding and communications about particular projects. My hope is to contribute to theoretical frameworks that help us understand how your interactions, use of tools, and the understanding or expectations of your project rules and community contribute to or distract from your abilities to successfully meet your goals. This information will help in my attempt to design tools that help facilitate project work, while at the same time help capture social details that make the work possible or the details that are disrupting the work. I'll focus on the tools that you use to do your project work, such as any kind of technology, spreadsheets, models, email specifically, and even knowledge or ideas that you use that might not be written down anywhere. I'm also interested in your candid feedback about team members or stakeholders that you interact with during the course of your work. Feel free to be as open and honest about your thoughts on teammates, as this is critical to the research. Do not be worried that your information will be used against you in any way. The information will remain anonymous and I will review collected information with you so that you can help identify any worries that you may have about how your responses are presented. This is a partnership, and I want to make sure that your views and opinions are adequately captured and that I'm not putting words in your mouth. I'll also be recording this interview unless you have strong objections? Are you okay?

S2: 01:43 All good. All good.

S1: 01:44 Okay. I'm willing to stop recording at any point if you feel uncomfortable. Recordings allow me to focus on you and support my analysis in the future. I'll also be taking notes during the process. This will be a very semi-structured interview, meaning I have a series of questions that I'm interested in but will likely generate a lot of follow-up questions based on our discussion. So it should be as conversational as possible. Does all this sound agreeable?

S2: 02:07 Love it.

S1: 02:07 Excellent. So let's get started. So I'm just going to give you a general agenda, and then we'll jump in and do everything. So first I'm going to do a general term overview to kind of orient you to some of the terms that I use, and some theoretical aspects. We'll figure out if there's a term that makes more sense to you, and we'll use that instead. I'll collect some general information about your role currently, any projects that you've worked on, project teams, and your organization in general. We'll turn our attention-- we'll focus specifically on a recent project that might not have gone as well as you would have hoped. A particular phase of that project, if possible. So I'll have a series of questions to

help develop what I call an activity-theory model of your project phase. We'll review some questions around how you store any kind of tools or artifacts related to a project. Like to collect some samples of email or these tools either today or over time. And that's all there is.

S2: 03:20

Okay. Good.

S1: 03:20

All right. So I use many terms when I conduct interviews and I want to make sure that we have the same understanding. So to begin, I'd like to go through the following terms and describe what I mean by them. If there's a more suitable term that matches the way you refer to the concepts, let me know, and we'll use that instead. Sound good?

S2: 03:41

Yeah.

S1: 03:41

All right. Here are the terms. All right. So the first term is activity or task. It's just a specific work activity. So in this case, a specific phase of the project work. Does that sound like a term you'd use?

S2: 03:56

Yeah. Totally fine.

S1: 03:57

I use the words tool and artifact, so anything that you may use to help facilitate your work whatsoever. So some examples: email, digital work samples, anything you might attach, if you use SharePoint, Slack, Wireframes, anything. So all the tools. I use the word subject. And this is where I get into some of the theoretical independence. And you'll understand this. So the subject is the person of interest when examining a work task or an activity. Okay? So a subject is actually conducting that task. For the purposes of this model that we're going to do, you are the subject. There's a term called object. And that's the goal or intent behind the project. And it's the ultimate "what" you're trying to achieve. In this study, it will often equate to the phase of the project that we're talking about, right? So design phase, it's pretty self-explanatory what you're trying to do, design some business. The terms community and organization, so this is a larger work community engaged in that task. Rules, so these are explicit or implicit rules that govern the relationship between you as a subject and your work community, right? So this is where we get into some nebulous things around what might I mean by rules. They're usually social in nature. So if you showed up to work not wearing clothes, that could be a violation of known cultural rules, right?

S2: 05:38

Depends on where you work, of course, but.

S1: 05:39

Depends on where you worked. And that's it exactly, that wherever we work has its own culture. And so there are certain rules of engagement that you have to abide by in order to be an accepted member of that community.

S2: 05:49

Correct, yeah.

S1: 05:51

Division of labor, this is going to be very common to roles on a team, all right? So it's just who within a team is doing what. Roles also. So project-specific assignments that distinguish work responsibilities across community. Supervisor, the lead coordinating roles or given tasks. And stakeholder, interested members of the project community. All those sound okay?

S2: 06:19

Yep. All good. All good.

S1: 06:19

All right. So now I'm going to just go over this model with you. The one I'm handing you is just kind of a notation model. It's called an activity theory model. And this model has been used to analyze long-standing work practices, primarily in healthcare, to help people understand when there's a large project at play, the many sub-projects or tasks that might be happening in order to achieve common

[good?]. I'm going to try to use the same thing and the same structure to help us articulate project work. Okay? And you'll see some of the same terms that I was referring to. That there's a subject, and this is the person about whom you are modeling this activity. So we're just going to assume that's you for now and we'll get into the meat of something. The object will be the specific phase of the project that we're going to talk about. And then we're going to talk about the tools that you would use in order to achieve that objective, right? It's a basic triangle. And this is why it's called a mediator. The tools are helping us mediate this relationship. The rules that I was talking about, the social construct, help mediate you and your community of work and this division of labor. The division of labor helps articulate how this overall community divvies things up in order to complete that work. Make sense?

S2: 07:52 Yep, makes total sense.

S1: 07:53 So a lot of this is going to very reminiscent of things that you might find on a traditional Waterfall project charter. Right? It's going to have your overall objective or work breakdown structure, RACI matrixes. Some of the things that aren't usually talked about, but are at the top of those documents, are some of these guardrails or guidelines that a lot of project teams will use. But other than that, this should pretty much feel familiar to most projects. Does anything about this seem confusing to you at this point?

S2: 08:25 No. I mean, it's all very straightforward.

S1: 08:29 Great. All right. So just to start, so we're gonna jump into some questions [crosstalk]. Can you share a little bit about yourself and your role in the current organization? So the name of the organization, your title, and what you do.

S2: 08:43 Okay. Name of the organization is [CollabCorp]. I have worked there about two and a half, closing in on three years. My role there, I was brought over to do Agile coaching Scrum mastering for a very specific team that was struggling with an understanding of delivering on their commitments on a sprint by sprint basis, and to kind of nudge a very large software company division of their very large software company to perform more efficiently by my observations and providing them some feedback. I've since evolved from my role into both a managerial focus and then also a tactical focus around execution management and trying to make sure that our engagements and projects run very smoothly and expectations are met and whatnot. What else? What else?

S1: 09:54 And do you run multiple projects?

S2: 09:56 Sort of. There's one very specific project that I'm running. So what's interesting about the work that we do, and how I've been kind of positioned over the last year, I'd say, to where I don't have a lot of hands-on tactical day-to-day execution focus. It's more of the HR managerial responsibilities, like client management and things like that, which is a little different than what I'm used to. But still, there's interactions that focus on productivity and process and making sure that all of the people that we work with are oriented appropriately to deliver maximum as opposed to getting kind of sideswiped by stuff.

S1: 10:48 Excellent. So what's your educational background?

S2: 10:55 I have a bachelor in history and sociology, which, in my opinion, fits very well especially with the sociological aspect to look at data, understand data as to how people work, and understand people and social organization. So a lot of what I studied in college was around social movements, social organizations. To give an example, one specific thing we studied was the Salem witch trials. And, obviously, these people weren't witches, or maybe they actually were. Who

knows? But it was interesting to see how the community rallied around certain aspects of the witches to try to flush that out and destroy it, and how you see that also a little bit in corporate America, where people are just keying on certain aspects of what's happening and rallying people around them to understand what is going on.

- S2: 12:01 So much like as we were talking earlier about the engineering focus and you talked about a CEO not understanding how engineers work and how they deliver, and things are going too slow, that can be a rallying cry for people who don't understand what is actually happening. They just know something seems wrong, and they don't like behaviors. So they try to snuff it out. And I see a lot of that. And I function often as an advocate for those who are struggling to find their voice and explain why they're doing something and to bridge the gap between, what I would call, 1950s management, some of the theories that were in place that came after World War II that are still in place today, that really don't work for today's knowledge worker.
- S1: 12:59 And I know that you have certifications related to project management.
- S2: 13:03 Yes. So I have a PMP certification. I also have Scrum master certification. I am Scaled Agile certified as well. Probably others that I'm not remembering, but those are probably the three key ones that I really would hang my hat on.
- S1: 13:24 Thanks. And have you ever done any work other than business analyst?
- S2: 13:29 I have. It's been several years since I've done that, probably back looking at like 2003, 2004 since I've done that type of work.
- S1: 13:42 All right. And since you are PMP certified, I assume that you're familiar with the PMBOK.
- S2: 13:47 I have heard of it, of course [laughter]. My version, I think, was version three. I think what are they up to? Probably version five or [crosstalk]--
- S1: 13:55 I think they just came out with five.
- S2: 13:56 Yeah, yeah. So just to give you some background on my feelings about the PMI, I think it is a very valid certification to go after and acquire for foundational knowledge. However, I hate the certification industry, that they certified pretty much anyone and everyone. And it leads to bad PMs, bad Scrum masters, and all of that. [laughter] So I just have to throw that out there.
- S1: 14:22 I agree. I'm using the PMBOK. So one of the problems, when we talk about project work, right, when you're trying to empirically compare and contrast, or understand or create a common language, the first question is how do you define a project, which can be very nebulous to the culture and [inaudible]. And so I simply use PMBOK as a structure for a project. How aligned is your current company's project work with PMBOK recommended methodologies?
- S2: 15:01 From the PMBOK perspective-- so just to clarify, so I have not went through the process. They've got an Agile certification now, and I don't know how that aligns with the PMBOK. I don't if it does now or not.
- S1: 15:20 So from a certification standpoint, it tends, from a PMBOK standpoint, to be agnostic, regardless of Waterfall or Agile simply saying that the project structure holds the same regardless of how you [use it?]. Right? So it's just the dividing aspects of the projects [crosstalk].
- S2: 15:42 Okay. I would say, from an organizational perspective, we're loosely identifying with PMBOK. I think we kind of have to in order to do this type of

consulting work. I think there are aspects that we leave out within the process. I mean, formal closure is not something that's really well done. It's just kind of the engagement as you get to a stopping point. And they're either going to resign or not. Execution is where I feel like we're the strongest for our organization. But we're an iterative development organization, so we run a sprint model when we can. And one of the things to note as well with this organization is that we are highly involved with innovation. So there's a lot of IT work, which is groundbreaking stuff. So there's no real path forward. So we do a lot of experimentations, stops and starts, and we try to drive value wherever we can. And some of the things that we try to do are just down a rabbit hole and they just implode, so.

S1: 16:49 So in that typical cycle, especially, in innovation work-- so in a typical kind of Agile flow, do you have time or have you built in any time for reflection, in general, to figure out what is working and what isn't working?

S2: 17:05 Some. Yeah. Some. So I'll delineate between previous work that I've done in the past versus the current work. And I'll use three examples. The first one is, there was an organization that I worked for probably three years ago, where the retrospectives were just, "Did you accomplish what you were supposed to accomplish. Did you do the story points you were supposed to? Did you close the story you were supposed to?" And that was it. You either did or you didn't. Then I moved to an organization where we actually talked about making work better. And what was fascinating about that organization was it was run by former Amazon engineers who had moved into management but still understood that there was value in bringing the team together in open and honest conversations. That's probably the best place that I was ever at that had a lot of great retrospectives to where we could drive change and actually become more efficient. And you saw teams' velocity really climb, as we implemented improvement opportunities. Move on to where I'm at today. There's some flavor of retrospectives and discussions around what we can improve upon, but nothing seems to really stick. We try to improve and people are like, "Ah!" And we kind of fall back into our old ways, which is really frustrating and whatnot. So those are kind of the three flavors that I've dealt with.

S1: 18:41 And in that third flavor of where you currently are, how stable is the team structure that you're working with?

S2: 18:49 Not as much. So I think with the particular project, or engagement, that I'm on, there's a lot more stability. But, unfortunately, the ownership, like product ownership and a lot of the duties of task assignment and whatnot, are driven by the client. And the client, unfortunately-- and traditionally, what I've seen over-- I've been working with a specific client for seven, eight years, and this client doesn't do well with continuous improvement. They check the box of Scrum and say that they're doing it because they have to do it. And so when they talk about improvement opportunities, it's really just kind of lip service, I'd say, even though the teams are stable. So I'd say, organically, the teams are looking for improvement, and they drive improvement, but it's slower because it's not purposeful and there's not a lot of intent behind it.

S1: 19:52 So just following up on kind of that second point that you made, where you've worked in an environment that promoted kind of open and honest conversations during retrospectives, was there any organization to those conversations, or?

S2: 20:09 Yes.

S1: 20:11 And how does that work, then?

- S2: 20:12 So the way I drive retrospectives, personally, is, what worked, what didn't work, what do we need to improve upon, effectively? So going down that path, we would document for the wider team and to push to management what was working, what didn't work, along with how we did during that sprint and what we were seeing. And we would actually have a larger conversation and rise up improvement opportunities from those discussions. So there were, I want to say, five teams that were working to build, what was a travel product effectively, a travel portal, for agent-based travel. So it was kind of cool stuff. We weren't well-integrated. We would push up information, and we would see common themes across the organization, which we would try to target. One of those was code-branching strategy, which was, and is, I think, difficult for a lot of organizations. So that was to make it more efficient, so you weren't doing a lot of cleanup work, and driving solutions around that, that would actually allow our engineers to have lesser time focused on building the code-merge of pushing up things into production, and actually just sitting back and saying, "Okay, we push a button, and this is good." So yeah, it was interesting stuff, and a lot of heavy complaints by the engineering side due to lack of efficiency.
- S1: 21:46 [Okay?]. Awesome. So when you made the comment that there-- I'll have to go back and listen to the tape, but yeah, that there were a sense of personalities being expressed during-- trying to put it [decent?].
- S2: 22:13 Yes.
- S1: 22:14 The personal aspect of this, right? So when people really felt-- when you felt that it was most contentious, during some of these retrospectives, what types of things were causing them? Can you think of any examples that were causing that level of personal frustration?
- S2: 22:34 I mean, I think it comes down to just pure frustration that these are-- I need to take a step back. I even see it from my side when I try to converse about things that are problematic. You get some engineers who are very talented but they're stuck in work that is highly manual, highly painful for them, and they can see other sides. They've been in places where it's like, "We did this differently here," or, "I know that we can do this differently and my life will be easier and I can focus more on actually finishing the business problems we're trying to conquer." It's almost like me in administrative work. I approve time cards every two weeks. I have 30 people to approve time cards. Then I'm chasing them down to say, "Hey, is your time in yet?" where I could be focusing on lining up the next solution to a business problem that one of our clients has. No. I'm stuck spending a couple hours, every pay cycle, pushing buttons and trying to say, "Hey guys, can you just get your time in?" and begging. And that level of oversight is-- I mean, it becomes naggy and whatnot. That's what I liken it, too. So the engineering side is basically like, "Oh, I'm very frustrated that I have to do all this crummy work when I could be heads-down coding, solving very complex business problems, but instead I'm stuck merging code." Yeah.
- S1: 24:15 So I don't want to put words in your mouth here, but would you say that in that example that you provided that there seems to be an issue brewing - just in that one example - of people understanding their roles? Or is it also that they are having to fulfill a role that they don't think that they should have to put up with?
- S2: 24:43 Yes. That is what I would say it is. And when asked to fill it on a spot by spot basis, it's not as bad. But when asked to continue the old square peg, round hole situation on an ongoing basis without a solution when you know a solution is available, that's where I think the frustration comes in. And what I would say, driving discussions around this retrospectives in my mind, you have to create the safe and open environment to where people can actually say what they feel and

point fingers as well. And I am totally fine with contention, and other people may not be in the corporate environment. But I would rather have someone yell at someone and curse at someone than sit there and stew over it, and me have to clean up the conflict afterwards because there's value to that. If people are that frustrated to where it gets to that level, I want to hear it so we can bring resolution to it, and it's not a bad thing in my mind.

- S1: 25:52 Do you think that people would be more willing to share if there was an open and well-understood kind of communication construct that helps them organize thoughts?
- S2: 26:06 Yep.
- S1: 26:07 So that they're not feeling kind of isolated and personal when [crosstalk]?
- S2: 26:12 Oh yeah, yeah. No, absolutely, absolutely.
- S1: 26:15 Well, that's great because hopefully, that's what I'm providing [laughter].
- S2: 26:17 Yeah. Yeah. Yeah. No, I think that's highly valuable. And one of the things that I've told teams in the past is, "If I ever say something that is absolutely stupid, or if I promise your time; I allow you to punch me in the face. Literally, punch me in the face. You can do it verbally or you can do it physically. But if I am doing something that you don't like, please tell me. I want to not know." And that's the type of teams that I like to build are teams that can function on that feedback because we're all family in the end. And that's what I want to foster, that level of continuity and interaction so that people, even though it feels bad, you can at least get it out. It's like Thanksgiving dinner with your whole family, right? That's what I like.
- S1: 27:06 Yeah. So do you prefer Agile or Waterfall Methodology? And I think that you said at your current company you practice more Agile.
- S2: 27:18 Yeah, we're definitely more Agile. And I'd even say we're very loosely Agile. and Agile has its different flavors. We're definitely more Kanban, I'd say. Just producing things all the time. We're not going to wait for the two-week iteration or the four-week iteration. We're going to try and throw things over the wall and get the feedback loop started. I believe, unfortunately, that a lot of Agile has become [bastardized?] Waterfall which sucks.
- S1: 27:49 [Scrummerfall?].
- S2: 27:51 Yeah. Exactly. And I mean, we could just do a little bit better if there was a little bit more rigor in there. But I've not seen it in practice. And the one place that I've talked about where we had safe, open retrospectives, that is the one place where we also practiced Agile to the best that I've ever seen it done, and it was fascinating to me.
- S1: 28:12 Really?
- S2: 28:13 So much fun.
- S1: 28:14 So it sounds like you're describing a world in which there is structure provided, but people aren't religious about that structure.
- S2: 28:27 Absolutely, yeah. And I--
- S1: 28:29 So it provides some guiding kind of principals and courses, but--
- S2: 28:32 Yeah. I tell a lot of people at this company, have told a lot of people in the past my belief. I'm like, "Don't ever talk to me about process, standards. I want

to hear about guidelines." Guidelines, just from a terminology perspective in my mind, guidelines can be broken. You can go outside the lines. There are boundaries, but you can go around those. Standards, to me you have to adhere to standards. And if you're trying to solve a very complex problem, I do not want people to have to adhere to standards. I want people to color outside the lines.

S1: 29:09

Excellent. Got it. Okay. So in a typical project or a sprint or phase in your company, so how would you describe or break down the phases of said work, just in general?

S2: 29:27

So we try to loosely follow Scrum. So what I would expect even though it doesn't always happen is that during the-- let's take a two week time box. And I would expect your typical Scrum ceremony, Scrum events. So you have your sprint planning and a demo same date, potentially. So the demo first. Then you go through retrospective after that. So two of those ceremonies. And then you go through your planning cycle. So I expect one full day of a two-week iteration or a four-week iteration to be dedicated to the closure, the wrap-up, and the discussion around improvement opportunities and the plan for the next sprint. What I would expect to happen next is for our engineers to go away for a couple of days and look at what's been planned for them. And hopefully the stories or whatever they're working on, task, whatever you want to call them, are very dev ready, and to come away two to three days later with kind of the seal of approval stamp of, "Yes, we can commit to these things or not." And then to have kind of the discussions around what needs to be elaborated on, what doesn't make sense. So about two to three days within sprint.

S2: 30:54

And then execution happens. I expect quality things and discussions to happen as stories are completed or within the story cycle. And then you get to the end of the sprint where you are demoing, retroing, and also planning the next sprint, overlaying that with the more strategic view of the grooming process to get things to dev ready even before you get to sprint planning. My expectation is always that you'll be talking about things on a roadmap four to six weeks out and starting to build those stories that people can execute upon as they can be planned if you need to pull in new things and what not to have stories that are dev ready and like a nice building that backlog. And so I look at-- so I separate Agile into kind of that longer-term vision and that shorter-term tactical execution.

S1: 32:03

And do you involve all of the team players in both of those?

S2: 32:08

No, so team-wise they are focused on tactical execution. I typically like to have some level of leadership or emergent leadership who those are the people you can point to and say, "Let's go groom." I'd love to have the full team in grooming sessions, but you can't always do that and continue onward with the current sprint.

S1: 32:36

And so just picking on this kind of the grooming session of the larger strategic visions and pipeline building, within your practice of Agile, though, what is the role, I should say, of documentation requirements from grooming to execution? So how do you substantiate ideology from this grooming aspect that may not involve the entire team, right, to transition to the more tactical where they're working on things? Are the requirements and some of the thoughts that were generated during that grooming element documented, or how are those things conveyed?

S2: 33:22

I expect epics to be built, or you could call them whatever you want, capabilities, epics, features, to be built at a higher level and then to be kind of stubbed out into a story format in that grooming session. I expect grooming to iterate, to where you get to stories that are well-framed, with key components of

the narrative, the basic role-goal statement, "As a whatever role, I'm trying to do X, Y, Z to achieve this goal," along with basic implementation steps so that we kind of align around how we're going to implement this that can be firmed up with sprint planning, and very specifically acceptance criteria. Kind of the goal is to get us to test-driven development. But even if we can get, "Hey, I'm the product owner," or, "I'm the person consuming this work. Here's how I'm going to know that it's good." Measure of success. What does that look like? Here's the checkpoint. If someone cannot articulate that from the business side or whatever the stakeholder's side would be, then I am concerned that we are going to miss the mark if they don't have that acceptance criteria.

S1: 34:35 And how do you or do you not document that? Are there templates, tools? Is it always different? Is it always the same?

S2: 34:47 I mean, I look at it in, I mean, basic Jira format. We put a lot of stuff in Jira. I've used other tools. Unfortunately, Jira is the one that seems to be the de facto. Don't love it, but I will put it anywhere. Azure DevOps is like the latest and greatest from Microsoft that you can document things in. But I come from the days of the thick functional specs. I still believe that there's a thickness to the requirements to get people aligned and move forward. That doesn't change, but you can do it. You can iterate on that faster and slice things down to where it's smaller components as opposed to one big giant document that you have to deliver on all the lines, which I think is the intent of Waterfall from back in the day.

S1: 35:37 And it's always a struggle between Waterfall and Agile, right? And most people will claim that it's documentation that's the culprit. Waterfall, being heavy documentation, and people saying that Agile is light documentation. I tend to say, "Documentation is documentation." Yeah, it's the quality of the documentation for what you're trying to achieve. And in this thing for what I'm talking about in this study, this is a tool, right? And so one of the big features, like on this diagram here when we talk about tools, is that we will look for areas of contradiction. So if there are two people on a team and the tool is understood even in its format between those two people, its effect to mediate their conversations is more effective than if there is no structure to it.

S2: 36:22 Totally agree.

S1: 36:23 So as we talk about tools and things in the future, kind of keep that in mind. And you can be as honest and open about this as possible. Some teams are extremely-- going back to your comment about kind of process and procedures versus kind of guide rails. That documentation kind of falls in that same camp that there are socially accepted ways to document things. Sometimes you need emails. Sometimes they need to be in template, or they don't exist, right? So the more you can highlight about those practices will be helpful to me.

S2: 36:58 Yep. I think the key thing, and I'll just elaborate on that, is what I've noticed. Where I've seen teams be most effective is where the team is empowered to say, "What is dev or engineering ready?" And they basically look at a story; the team aligns around it. And this comes from the grooming or sprint-planning process to where they're like, "We can't consume that story yet. It doesn't have these two key components." And the product ownership is just like, "What?" in a lot of cases. But it's the democratization of the engineering effort, to where you empower them and they'll do great things, as opposed to what I see in a lot of cases where two bullet points are pushed down on a team, and they say, "Go do." And I've seen that a lot in Waterfall and Agile for that matter. And that's where I think Agile breaks down because people think they can get away from the business stakeholder side, not specking out what they really want. And then they

bitch and moan when it comes back with very little.

S1: 38:11 So do you have any methodologies or tools that you consider unique to your work environment or project community?

S2: 38:22 I think they're more unique to me than they are the working environment. And just, in general, my philosophy around working at more of a start-up type environment and driving-- I talk to people a lot about singular focus because what I get in an organization-- so we're 650, 700 people total. About 400 of those people sit in a call center, so we subtract them. So we've got about 200, 250 people who are in this knowledge-working space, and I straddle the line between project-based work and internal work. And the amount of ideas I even hear on a daily basis of, "We should just do X. We should just do Y. We should just do this. We should do all of this," a lot of people take that as gospel in the environment that I'm in. They're like, "Oh, we need to go down this path." My response to that is, "I'm not doing that." And I've had interesting conversations with coworkers to where they're like, "What do you mean? We all agree that we should do this." And I'm like, "Yeah, that'd be great to do. What about the other items that we already agreed to do?"

S2: 39:46 And so it's more me-based because, in my head, I've got a list of priorities. I'm like, "This is really critical, this revenue capturing activity." And when the owner of the organization says, "We're losing revenue. Our project workload is down. We need to bring it back up." And one of the things that-- and I laugh about this. So from the movie Elf apparently it's, "Make revenue your friend.: And that's what he says a lot. He has the elf drawn on a whiteboard. Make revenue your friend. And I'm like, "That's cool. I don't have to do anything else at this point but make revenue my friend. And anything I do, if I align it back to revenue, then I'm good." And people will challenge me on things and I'm like, "That's not going to increase revenue. Why are we doing that?" And I've had conversations with people-- one of the things that we talked about doing was onboarding, better onboarding so that our people are ready to go out to client and do great things. That quickly got expanded by the group that I work in to, "Oh, we're worried about a member of our HR team getting onboarded." And I'm like, "Well, yes, there could be a direct impact to revenue, but why do I care if the HR person is not onboarded 100% correctly? They are not a billable person." And I'm like, "Why are you increasing scope that we now have to worry about? I'm not doing that." And people are like, "How can you get away with not doing that?" And I'm like, "Because I'm not. Because I can tie everything back to revenue." And if that doesn't directly impact the bottom line, then at this point, from what we've been told, I'm not doing that. Yeah, so it's kind of fascinating. There are a million and one things you can do in an organization. I choose to do less so that we can actually do the things we want to do right.

S1: 41:46 So given that, I think that you might find the model that we're going to work through very enticing because it is really extremely goal-oriented, right, singularly. A lot of people have some trouble with it because of that fact, right, because the possibilities are endless and the nuances are always there. But the more that you are just explicit about an activity or goal, you can truly map and unwind everything associated with it. So I think this will be kind of fun to go through.

S2: 42:16 No, this will be very fun to [hit?].

S1: 42:18 And then in your current job, you've mentioned stakeholders and partners. You do work with third parties external to your company and you work with them directly when facilitating new projects?

- S2: 42:29 Yes.
- S1: 42:30 Okay. Can you tell me just in general - you don't have to reveal anything about them - but the nature of that role and that relationship? Are there multiple companies at times? One?
- S2: 42:38 Most of the time, it's single focused to where I think the most we've seen is maybe two dip in at once. But what we see typically is, I'd say, lack of communication from a partner, partners promising things, partners holding the keys to relationships and basically saying, "We're signing you up for this. Oh, and we already promised the customer." And so just kind of frustrating scenarios to where we don't hold the keys to the castle of how we want to move forward.
- S1: 43:16 And you've used the word we a lot, which describes, I'm assuming, your team [crosstalk] integration, and these nuances between the team and stakeholders, right? So can you touch on how you personally draw those lines?
- S2: 43:35 So yes, I can talk about how I draw those lines in terms of roles. From my perspective, the roles should be working in collaboration at all points to have conversations before anything is committed. And I fall back to commitment as being the big driving point. That was my biggest philosophy. If you commit to something as an individual, if you consume a story and say, "I can do this," you better damn well know what you're committing to. A lot of people will just say, "That looks like something-- it may kind of make sense. I'll run with it." That's where you end up getting shot. And then stakeholders as well saying, "We are having you commit to X, Y, Z," that's not a good discussion either after it's normally after the fact that they've already committed you. And so what I like to typically see is collaboration discussion around what may come up, even if it's in the moment. If a customer calls you and say, "I need this right now," let's discuss what that need is, and take the extra time to say, "Okay, guys, here are options around this. Let's document what we need to do, and how we think things need to go."
- S1: 45:04 I'm going to change gears now and focus on a specific project. So--
- S1: 45:12 At any point where you need to stop, we'll stop and we'll pick it up whenever you are ready.
- S2: 45:15 Okay. Okay, we'll probably do 10 minutes more. Is that all right?
- S1: 45:17 Perfect. That's good. So this is going to tie into kind of that time box of email that I'll analyze. So can you recall a recent project within the past year - think of something that's fresh in your memory - which you or other project community members found difficult or challenging? Right? Something that you would like to learn from by working together?
- S2: 45:43 Yeah.
- S1: 45:44 So what would that project be?
- S2: 45:48 Do you need a name of it or just generalized?
- S1: 45:52 Generalized. That'll be enough.
- S2: 45:54 We had a website redesign project that was tied into a back-end kind of CMS-type project. So the website was driven by custom stuff that was being done via CMS. A third party was doing the web design work and the CMS work. And they had a product that was a custom-built product for health clubs. And we were in charge of doing the design work and the project management.

- S1: 46:29 For the build and release of this?
- S2: 46:32 For the build and release of it, yes. Just for the build and release of the website portion.
- S1: 46:42 And just to be cautious, so the website that your project team was responsible for, were there also other deliverables associated with a larger project that other people were working on? Or was this really the only one?
- S2: 46:57 Yes. So there were other deliverables which was the customization of their CMS product that would drive dynamic content to the website front end.
- S1: 47:08 And you weren't involved in that?
- S2: 47:09 We were not involved in that. We had no say over that.
- S1: 47:16 Great. And how long was this project in process?
- S2: 47:22 When I encountered it-- so we started in March or April of that year and I got involved July/August.
- S1: 47:36 And what year is this? Is this--?
- S2: 47:38 This was 2018.
- S1: 47:44 Okay. And what was your specific role on the project?
- S2: 47:48 Very consultative initially. I had to come in and try to rescue where we were. Basically our PM and also our designers were waving the flag that things weren't going well and that we were missing deadlines. So my management asked me to come in and say, "Okay. What is going on here?" and assess the situation with some of our technical people, and figure out a path forward to get to a firm date of delivery.
- S1: 48:18 Great. And so from the point that you kind of got involved, to the point that it was complete, I'm assuming this was done in a iterative Agile-type way, or was this--?
- S2: 48:34 No. It was kind of loosely Agile. So the third-party vendor that ran the CMS side, which was really driving the whole engagement, was very much Waterfall-focused. And they also had an offshore component that did a fair amount of their work. So, yeah, definitely not the most Agile of situations.
- S1: 49:01 And so, if you had to, kind of chunk it or phase it out, were there certain phases to this project, or--?
- S2: 49:08 Yeah. I would say that we attempted to do a design phase for the front-end bit, and then we attempted to move into development of that design.
- What was interesting, the client that we had was struggling because the marketing department was handling the website. They struggled to make decisions around the design component-- sorry, it's still on? Okay, good. Struggled to make decisions around the design component to where we had a design lockdown deadline, I think it was, I want to say mid-June. Real design was lock downed probably November of that year. So decision issues around even things as basic as colors and whatnot.
- S1: 50:07 And, so I'm just trying to also help timeline those dates that we can [crosstalk] email. So 2018--
- S2: 50:15 2018, so what you will see from me when I started getting involved was late July, all the way through December when we rolled off, and basically we said,

"Okay, we can do no better at this point," because the CMS component was driving the whole timeline. And we couldn't get commitment from the people developing the CMS, the custom CMS code.

- S1: 50:39 So what I will say when we capture email, we'll just focus on 2018 July through December. Email coming in or email going out, right?
- S2: 50:49 Okay, yep.
- S1: 50:49 And then the question will be do you structure your email into separate folders? Do you do that?
- S2: 50:55 I put it all into one folder that is a baseline for [ClientOrg]
- S1: 51:01 [ClientOrg?]
- S2: 51:04 Yeah.
- S1: 51:05 Okay. And were you running this project or did you have any superiors that you had to answer to?
- S2: 51:16 No, it was me in the end. We actually let go of the PM who was working on it due to I think her lack of ability to understand the situation, wave the flag appropriately, along with the design people. We ended up letting them go, and we went a different direction.
- S1: 51:37 Did this happen during that July to December time?
- S2: 51:39 Yes. Yes.
- S1: 51:43 And so, not that you haven't already described it, but was that the most challenging aspect of this project, or what was the most challenging?
- S2: 51:50 Most challenging aspect, in my opinion, of the project was the fact that we weren't getting clear status and understanding as to what needed to happen from the other vendor's side in order to meet our timelines. You add in the fact that they claim they didn't have control over it. So the key person that I was dealing with - I'll just state his name; guy's name was [Jasper] - [Jasper] would come back to us often and say, "Well, they've got other things in the queue." So basically it was one of these feature factories that we were dealing with, where they had 20-ish clients who were feeding things into the queue, and they were picking them up as they could - their engineers - to solve them. And he didn't have any control over that. And he's like, "Well, I'm trying to gain control, blah, blah, blah, blah, blah." And it was just a situation where the interaction wasn't focused enough on our client in order to help move them forward. So it's just not a good scenario.
- S1: 52:58 Excellent. So just in general-- this is going to be very quick, but do you prefer this project that you're talking about over other projects you've worked on in the same company?
- S2: 53:11 When I say prefer, what do you mean by prefer?
- S1: 53:13 Do you think that its representative of the types of projects that you work on? Or is it a--?
- S2: 53:21 I think it's a good representation of a challenging project. I think there are other projects where things move a little bit better, but I don't think it's as good of a case study and a real-world example like this one is. Like the other stuff that I deal with are driven by engineers, and I find those to run a lot more smoothly because they know what they need and they work hard to get it.

- S1: 53:52 Obtain it. Yeah. Excellent. And so this phase that you're talking about is the design phase pretty much, right?
- S2: 54:03 Yeah, so it was design and implementation.
- S1: 54:06 Design and implementation. Okay. So can you describe for me basically the standard tools that you would use in this company, on this particular project to facilitate the work? So things that you would create, things that you would use or stand on? So basically just a list of all the tools that you might use.
- S2: 54:33 So we would use mocks and wireframes from the design side. We had a project tracking tool; I forget the name of it. It's kind of like a Basecamp or something similar to that. A lot of heavy email interaction, both between us and the client, us and the third party vendor, and client to client departments to facilitate resolution of stuff. What else? I mean, we used daily stand up as a vehicle to talk through things. There wasn't a lot of heavy status reporting or anything like that. But I'd say, yeah, kind of those three main tools of email, project tracking system, and stand ups--
- S1: 55:18 Going back to your comment about kind of clear deliverables, what were you responsible to deliver?
- S2: 55:24 We were responsible to deliver the wireframes and mockups. And we weren't even responsible to build those out.
- S1: 55:35 Just the--
- S2: 55:35 So just the wireframes and mockups that aligned appropriately with the content that was driven from the back end.
- S1: 55:48 Can you remember, if you can, a list of people, just as best you can, that were working on the project team during this phase, and what their roles were?
- S2: 55:59 Yep, we had a director of IT. We had his, what I would call, a BA, kind of a multi-purpose player. We had an API guy from their side. We had marketing finance-- marketing and finance were the two key representatives from the client. We had the vendor representative, and then sometimes we had some of those technical people involved. I'd say two main technical people, one to work on the API between the front end and the back end. And then the other was more of an infrastructure guy to kind of scope things out as to what we needed. We had, from our side, a designer, a PM, and then kind of a BA types/test type. And that, I think, was kind of the core project team.
- S1: 57:05 And do you remember any names?'
- S2: 57:10 Oh, yeah. So [Sam] is the director of IT. Do you need last names or no?
- S1: 57:15 Last initial.
- S2: 57:17 B. [Sam] B. [Jasper] is the third-party vendor representation.
- S1: 57:25 [Shasper?]
- S2: 57:26 [Jasper].
- S1: 57:27 [Jasper].
- S2: 57:28 Yeah.
- S1: 57:28 With a J?
- S2: 57:29 Yeah. I can't remember his last name. We had a [Kent] who was the client's

BA. What were their other names?

- S1: 57:41 And on your side?
- S2: 57:42 And on our side we had [Todd G], who was the original PM. We had [Carl F], who was a BA/tester. We had [Mary G], who was the designer. We had me, who was in the unfortunate position of cleaning up the mess [laughter]. And that's it that I remember. Yeah.
- S1: 58:09 How many of these people did you see on a daily basis, face-to face?
- S2: 58:15 Face-to-face? I'd say [Sam] I saw face-to-face. [Jasper] was remote. [Carl], I saw face-to-face. And [Kent] I saw face-to-face. Those were kind of the core people. The rest of the people were on the phone.
- S1: 58:38 Okay. And out of everyone that you talked to-- so you said that you used email a lot, right, to [communicate?] And then were there any members that you depended on heavily to accomplish--?
- S2: 58:49 [Kent].
- S1: 58:50 [Kent]. [Kent].
- S2: 58:51 And then [Sam] would be the driver. [Kent]! I would kill to have [him] work with me wherever I am.
- S1: 59:02 And [Kent] was on the client's side?
- S2: 59:05 Yes, [he] was on the client side.
- S1: 59:08 Okay. Are there any members that you wish you didn't have to rely on?
- S2: 59:13 [Jasper].
- S1: 59:17 Any incidents or explanation why [laughter]?
- S2: 59:20 Explanation why. We had a fight over code management in the very early stages and my understanding of how people should be developing in a more Agile fashion. He claimed that they were highly Agile. And he just basically told me that there's not a lot we could do to drive the engineering side to get what we wanted to provide feedback on. And I hammered him on, "Where is your code? How are you reviewing it? What are you doing to get things pushed into production or into a test state?" And he was just like, "Hey, it's all good. I'm making money."
- S1: 01:00:00 Nice. Okay. So we'll probably have to do a different session just to go after this, which I think will be--
- S2: 01:00:10 Awesome. This is fun. Yeah, I'm actually really enjoying it.
- S1: 01:00:14 Yeah. And honestly, this is really helpful. You [crosstalk]--
- S2: 01:00:15 Yeah. Yeah. This is really, really fun for me as well.
- S1: 01:00:18 Okay. So the last question before-- and I'll table this and then schedule another get-together if you want.
- S2: 01:00:23 Yeah. Oh, yeah.
- S1: 01:00:24 So how many of the people that we just talked about and listed have you worked with on other projects?
- S2: 01:00:31 [Carl], I worked with on another project, but that is it.

- S1: 01:00:40 And so your own internal team that you dealt with?
- S2: 01:00:42 My own internal team. So, unfortunately, [Todd], who was our PM, I don't think I worked with [him] on anything else. [He] would bounce questions off me, but they were aside from what I was working on directly.
- [silence]
- S1: 01:01:14 And so was it [Kent], the one that you--?
- S2: 01:01:18 Yes.
- S1: 01:01:19 So someone that you worked with that was no longer on the project that you wish you had back? But what did [Kent] do specifically-- what was it that this person did that really helped you facilitate the work?
- S2: 01:01:34 Blunt. Honest. Driving for clarity at all points. [He] was surprisingly young, but [he] was very focused on what [he] needed to know in order to make things happen. [He] would call out bullshit very quickly, which was nice, so that I didn't have to do it. Yeah. Very, very big on being crystal clear on what needed to happen.
- S1: 01:02:04 All right. I'm going to pause.

-----SECOND SESSION-----

Transcription details:

- Date: 04-Jan-2020
- Input sound file: GB_12112019_Session2.mp3

Transcription results:

- S1: 00:01 Wednesday, December 11th. [Gabe]
- S2: 00:05 All right, [inaudible] both. There we go.
- S1: 00:07 All right. We were talking about this project, so for this particular project, the design project related to the website to the CMS Connection, the tools that you normally do in the design phase of a project, this one in particular, you'd mentioned that you deal with mock-ups, wireframes. Are any other tools that you would consider kind of primary to this type of work?
- S2: 00:38 So it was the mocks and the interactive wireframes and that was about it I would say. We use some project tracking tools - I'm forgetting the name of the tool that they used; it was kind of like Basecamp and whatnot - in order to pass tasks back and forth since the web design or the web development aspect of the project was done from the third party who's also doing the CMS. So we'd have to find some way to facilitate, and those guys were all offshore.
- S1: 01:17 Where were they? Do you remember?
- S2: 01:19 I want to say India, and they weren't one of the better shops that I've dealt with over there.
- S1: 01:30 And did you guys hire them, or the client hired them?

- S2: 01:33 So how it worked was the client settled on the CMS tool and then said, "Okay. We need that to facilitate back-end operations." Then they went and they were like, "Okay. Who do we get to do the design work, web work, and whatnot?" so design and development. We came in too pricey with our proposal so they went with the same company that was doing the CMS and then outsourced project management and design to us.
- S1: 02:07 A recipe for success.
- S2: 02:10 Apparently, yeah [laughter].
- S1: 02:12 Wonderful.
- S2: 02:13 Yes.
- S1: 02:14 All right. So you used email a lot to communicate back and forth through [crosstalk]?
- S2: 02:17 Lot of email communication. I mean, daily standups was a big thing as to how we facilitated everything. But for the most part, Tracking Tool worked relatively well when we actually started putting some rigor into it. In the early stages it was just, "Oh, it's just [task?] level." Very choppy stuff, so.
- S1: 02:44 And did you have to deal with any budgetary stuff or finance stuff in the midst of the project? Or was that all handled--?
- S2: 02:50 I did, from the design and development side, so there was a lot of back and forth on can they afford our people to do this work, what value they were providing, so a lot of spreadsheet stuff for us.
- S1: 03:16 So for this particular phase of the project, what would success have been? In that design phase, what were your deliverables or what--?
- S2: 03:26 Success would have been locked and loaded interactive wireframes that didn't change at a point in time that gave the team who was doing the web dev work enough time to develop and also integrate their CMS tool. And to just give you idea of the milestones and duration of the project, we started, I think, in March of 2018. We should have been locked on interactive wireframes by July 1 in order to head-- I think it was a sometime in mid-September launch date. And to give you an insight into the problems of the project, the integration of the CMS was dependent upon the web design and vice versa. So like when we did lessons learned, how I would have structured this was, put the CMS in place, and then build over the top of it once you're static or once you think you're static, so.
- S1: 04:37 So it's kind of an order of operations.
- S2: 04:39 I would say so. Not saying that we could've pulled that off, just the way they function. But it's just interesting.
- S1: 04:48 Okay. And you had talked about the team members that you worked with on this particular phase of the project. And can we just rehash those as much as you can in terms of memory, like the people that were there?
- S2: 05:09 Yeah. Do you want them by name or just by role?
- S1: 05:10 Sure, just like first name and then their role.
- S2: 05:12 Yeah, so when I first started engaging on this there was [Todd] and [Mary]. [Todd] and [Mary]. [Todd] was our PM, [Mary] was our designer. [Mary] had another person [she] worked with - can't remember his name - who was outsourced design. So basically, [Mary] was our main designer, [she] would

come in with the mocks, wireframes, and then [she] had somebody who would help [her] move faster. 1099 guy. Then we had [Sam], who was the client. Then we had [Jasper], who was the third-party vendor. And then we had a bunch of [Sam's] people who were marketing-based, mainly marketing and finance. We had some people who did operational-type work over there. So there was another [guy], [Kent], who was kind of our BA-type role. And [he] would gather information from like-- so this was for [an organization] over in Redmond, [ClientOrg]. Basically,[Kent] would do all the navigation of the work aside from finance and marketing. Marketing had [Lonnie] at the table and on the finance side. So yeah, I would say that that was kind of our core team. And then we had, obviously, third-party developers off to the side and whatnot, so.

- S1: 07:01 Okay. And so it sounds like there's your company.
- S2: 07:04 Yep.
- S1: 07:04 There's your client.
- S2: 07:06 Yep.
- S1: 07:06 And there's a third-party developer.
- S2: 07:08 Well, I would say, it gets even more interesting than that. Third-party developer. The main guy, [Jasper], who we worked with didn't have a lot of control over the teams over there. So they were outsourced development teams on top of that in India. The [ClientOrg] people, they were people who, although they were under the umbrella of [ClientOrg], ran amuck and did whatever the hell they wanted, so yeah.
- S3: 07:45 Redacted – not part of interview
- S1: 07:57 Redacted – not part of interview
- S1: 08:25 [inaudible] cool. And so then, again, just to reiterate, the primary relationship here was [ClientOrg], which was the one creating the website CMS creation type thing.
- S2: 08:41 They did a whole rebrand--
- S1: 08:42 A whole rebrand.
- S2: 08:43 --of the entire organization. And that was both facilities and their online presence, and they wanted to move to a more modern platform to where you could put classes online. That was their key driver. Okay.
- S1: 08:58 And then they had used this third party to develop the CMS part, they worked with you guys, again, to kind of coordinate the design and integration development and everything with this other company, kind of managing the whole process for them. And the developer also outsourced some of their work to other people. So in total, I mean there's about four to five different kind of entities at play with people for those [inaudible].
- S2: 09:32 Yeah. It was a fascinating process. Not a good one. Fascinating in a bad way.
- S1: 09:38 And so in terms of the-- in this particular sample of a project, I mean were there any kind of ground rules around that you established upfront, I mean outside of--?
- S2: 09:58 It was interesting. First communication I had with [Jasper], the leader of the outsourced developers was I'm like, "[Jasper], what are you doing, man? Because you should be dropping code like every couple weeks for us to do testing on and

figure out." And [Jasper] was from the waterfall world, said, "I've never seen an organization that functions where you're delivering new pages on an ongoing basis." He'd been with the company 20 years, not really seen outside of the normal world. Was in Michigan, did all his work remote. Seemed like a nice enough guy but just didn't really understand how to accelerate what needed to be done nor did he have the power to pivot the team that he was working with on the other side of India. So he would go to them and he'd be like-- a lot of the things that he would say to us were, "Oh, well, that sounds like a change order," or, "Oh, I got to get it into those guys queue and see what we can do." His main point was you guys were changing designs and the CMS was a product specifically for [developers?]. So it was an out-of-the-box product. We weren't building it from scratch, we weren't building off one of the standard platforms that are out there. And he's just like, "Well, our program really doesn't do that, that's custom dev." So those are kind of the things, the roadblocks, that he would throw at our way. And I would be like, "Oh my God. Just too much, bud, too much. We need to figure out how to do better." And I just don't think he was empowered to be able to do better.

- S1: 11:46 So it sounded like that he had kind of a series of operations and tools and expectations of his partners and how they actually facilitated the work that wasn't in alignment with kind of the [inaudible] design space that you guys are in.
- S2: 12:00 Exactly.
- S1: 12:00 So there was kind of a tool mismatched in some ways.
- S2: 12:03 Yeah. It just wasn't like-- I would have either went two separate ways. Either we would have done all the work and built them something custom or we would have done none of the work and they would have owned it all, which is what ended up happening in the long run. They just took it back and it took them a good six to nine months. Probably they were about a year behind schedule, I think, on that project and I'm surprised that, I mean, [Sam] did not get fired. Because he was threatened numerous times.
- S1: 12:38 So ultimately, in this phase of the project, you guys, did you reach stable interactive wireframes as best you could?
- S2: 12:49 I'd say as best we could. When we left the engagement, it was December-- I think it was December of last year. They were still iterating on some aspects of the design. But we were in a point where there was enough stuff delivered, we could start testing. We brought in a tester in about October time frame and she was just hammering away the site. She's like, "This doesn't work. There's no flow. It doesn't work. It doesn't work. It doesn't work." And they eventually just said, "Okay, knowing that we're so far away from this, we're going to go with the lower-cost model of just working with the offshore team and putting the end date way out." So we got to where I think we needed to be but I think really, I mean it didn't flow from my perspective. It was just kind of like one of those wah-wah-wah-type projects. And that's a technical term.
- S1: 13:57 All right. So this is kind of similar but kind of just follow-up questions. So this kind of goes back to the ground rules that I was talking about, that you like to work with an established project, and this sample that we're talking about is fraught with all kinds of communication issues from the getgo. Do you guys, when you engage a client, or in this particular client, do you engage with them and kind of lay out expectations and time lines out of the bat?
- S2: 14:28 Yep. Yep, typical.
- S1: 14:30 Typical kind of "This is what we're all agreeing to"?

- S2: 14:33 Mhmm.
- S1: 14:33 And how do you do that, verbally or do documents?
- S2: 14:37 Contractually.
- S1: 14:38 Contractually?
- S2: 14:38 Yeah. So normally, a Word doc of some regard. We might have a financial model over the top that we share with the client, but.
- S1: 14:52 And when working with third-party participants--
- S2: 14:57 Well, what I have advised is that-- what I advise is that we rather don't do this kind of work going forward, or in the contract for the third-party participant, they're beholden to us because we had no power.
- S1: 15:24 So it's a lack of power [crosstalk]?
- S2: 15:25 Yeah. I would come to them and they'd be like, "No. You're not our budget holder. Sorry, man. We don't report to you." Lots of that kind of stuff. Never fun.
- S1: 15:38 So when working with third-party clients in general, are there any things that you explicitly require or is it usually just-- I mean, being kind of the client, in some cases, you have to do what they say. I mean, are there any strict contractual ground rules that are kind of red lines for you guys?
- S2: 16:01 For me, if there are multiple vendors involved, I will want some level of steering committee oversight that has their hands deeper into the process. But if no one's going to provide that at the contract outset, I would be like, "Okay, guys. We need to tie them to us in some way so that we have shared goals, so that we can kind of march together, or else this is not going to go well." It would be different in my mind if we were two teams sitting in [the same city] and could collaborate. But you throw in basically like a feature factory, which is what they had, things get thrown in the queue, tick, tick, tick, tick, tick, tick, they get done eventually and they'd spit them out. You know, we're working with multiple clients at a time?
- S1: 16:57 Right.
- S2: 16:57 So I would say, if you've got a custom dev shop, which is what we are - we're non-product-based - you would want to engage with another custom dev shop as opposed to a product company, which is-- they could throw up all sorts of roadblocks. So getting that shared vision and basically measuring contractually in [both?] [inaudible] should have been what they did. We're not that advanced, so, or weren't at that time.
- S1: 17:30 And beyond the things that we've talked about as being obstacles to this project and others, are there just-- are there any other obstacles either on this project or in general that prevent you from getting your work accomplished?
- S2: 17:53 I mean, the main one was the order of operations and the expectation that we would provide them. So they always pointed back to us. Why aren't all the wireframes done? And it would just be like, "Okay. Can't we just do and then iterate?" It was how the product was built I think. There was so much dynamic shit, content was being spit into the front-end, we couldn't make changes on both the back and front-end without messing everything up. And that wasn't really understood or clearly articulated upfront. I'm used to systems that are a little more flexible.

- S1: 18:38 So if you had to pick one tool or one piece of knowledge that you couldn't do your job without, what would it be? And if you have more than one you can--
- S2: 19:01 I mean, it does come down to shared vision for me. Some form of roadmap or deliverables that are agreed on by both sides. So in situations like that, I've done enough consulting to where I come back to the fact of we need to be tied to each other with performance stuff in the contract so that we don't just sit around and point fingers at each other if we're going to function in the slightest.
- S1: 19:41 Is there a tool that you find distracting or disruptive to your work that either you or your clients or anyone else has used?
- S2: 19:52 I will add the caveat of if you have a project tracking tool and people use email around that, the email becomes distracting. Yeah. Why have the project tracking tool, which is what happens in most cases?
- S1: 20:15 And on this particular project, what kind of project tracking tool did you guys use? Or do you remember?
- S2: 20:20 Yeah. So I think it was Basecamp--
- S1: 20:25 Basecamp?
- S2: 20:26 --or something like Basecamp.
- S1: 20:27 Like Basecamp. But again, you guys weren't in charge of that tool? It was the client-- the [ClientOrg]?
- S2: 20:35 What do you mean [ClientOrg]? This would be a third party--
- S1: 20:36 Oh, a third party.
- S2: 20:37 --who used us. It wasn't the most user-friendly. It took us a long time before it actually gave us the write access to it. They wouldn't let us assign and reassign. They had all these custom workflows and things like that. It just felt like a big black box.
- S1: 20:53 Really?
- S2: 20:54 No. it was awesome.
- S1: 20:56 All right, you answered that question for me. So on your projects, on this [planner?] cross clients, do you guys maintain any kind of in-house digital libraries where you keep assets? What do you guys do?
- S2: 21:14 SharePoint or Confluence. Mainly SharePoint notes.
- S1: 21:16 SharePoint notes?
- S2: 21:17 Yeah. I prefer Confluence. But we get everything free from Microsoft Partner for SharePoint.
- S1: 21:25 Did you guys use SharePoint on this project?
- S2: 21:29 I think we were using Confluence on this one.
- S1: 21:30 You were using Confluence?
- S2: 21:31 Yeah.
- S1: 21:35 Do you guys maintain those at history? Is it still there or is it gone?
- S2: 21:40 It's been migrated over. We'll probably never look at it again.

- S1: 21:52 All right. Well, that's very helpful.
- S2: 21:55 Hopefully, that gives you [crosstalk] what you want.
- S1: 21:57 No. That's great. So now the hard part of my job here is going to be, as I mentioned, assessing email from that period, right? So my goal is to kind of take a copy of your email inbox or outbox, right? I'm going to focus my attention only on the dates of this project. Would you--
- S2: 22:16 And how will you use the emails?
- S1: 22:19 So the content of the email I'm not really focused on so much. The process that I go through is that I'll limit the view to the dates of this phase of the project, right?
- S2: 22:29 Okay. Yup.
- S1: 22:30 And then we'll sort the email and look for any attachments. And really my focus are going to be on the attachments. And then I'll go to-- if there are things that I find in multiple attachments-- usually they're kind of the same thing version iterated over time. And I'm paying attention to the parts of the email that include the headers. Like who all is copied on these things. So I'm really looking at the navigation of where these attachments are going and flows.
- S2: 22:54 So you're looking at the analytics of like how people engage with the emails?
- S1: 22:59 Exactly.
- S2: 22:59 Okay. Got it.
- S1: 23:00 And then I'll go to the content of an email only if there's some confusion that I have about trying to understand an attachment.
- S2: 23:05 Got it. Will this surface in your dissertation [crosstalk] content?
- S1: 23:11 And everything will be anonymized--
- S2: 23:13 Okay. Good.
- S1: 23:13 --completely. And you'll get full purview over all of this and to look at it in advance in case there's anything that's--
- S2: 23:18 Okay. Perfect. Okay, yeah. It's that whole NDA world that I have to--
- S1: 23:24 Absolutely. And if I need to sign an NDA or anything, happy to do so. Whatever you need me to do. So I'll keep it simple between you and me. No one else sees this data. It's locked down.
- S2: 23:33 I'm not too concerned about that until you sell all [ClientOrg's] information on the street. But I doubt that will happen.
- S1: 23:38 Absolutely. No. And so what I'll do with that information is I basically go through and much like we created this profile today, right, this is a very skeletal approach to understand. And just in talking with you, I have a pretty clear indication of where some of the major constraint areas are. But now what I want to do is see if that's kind of reflected in empirical evidence in the email. And then the whole goal is if I can find that and I understand how these relationships are structured somewhat, the idea is through-- the output of my research is basically find some ways focusing on attachments and time periods and project managers with the proper tool could say, "Here are the attachments in play. These should be included. These are something else." And I'm probably going to run into that, right, where I'll look at some attachments. But I'll know based on what we talked

about if they're people that aren't in any way involved with the people you've-- they are not part of my scene, right?

S2: 24:36

Okay.

S1: 24:36

Unless they pop in related to some attachment and then I'll ask you later, "Were you aware that these people were part of this communication?" And a lot of that is to just give you insights, right? This is a reflective process to say--

S2: 24:46

Yeah. Oh, absolutely.

S1: 24:47

--"We all think a project works this way," and when you look at some evidence, some things might stand out to be like, "You know what, I never even stopped to think about the impacts of this person coming in or them being included." Or, and another thing that really kind of is highlighted in many cases as you start working with someone on a particular deliverable that they're in charge of-- and we'll have one more interview in a couple of months when I do all this work--

S2: 25:13

Okay. Yeah.

S1: 25:14

--where I kind of show this to you and we talk back about it, right, and reflect on it. That usually what we find is that you will assume that someone knows something but if you look at the trail of some of the attachments, you might find that there is a gap in what they might have received and so it starts introducing confusion and things like that. So it's those types of things that I'm looking at.

S2: 25:39

Yeah. Makes sense.

S1: 25:40

I promise to gloss over any kind of personal identifiable information. I'm not worried about any of that.

S2: 25:46

Yeah. I'm not too concerned.

S1: 25:48

All right. I'm going to close this because I have all I need for now.

APPENDIX E – REFLECTIVE QUESTIONNAIRE FOR (E.D.A.S)

Instructions

Thank you for participating in the interactive testing of E.D.A.S (email derived activity system). The model presented was populated with a .PST file that you submitted containing DSMOD-AT project emails between 5/15/2019 and 12/26/2019. The visualization also contains custom data that you provided during the data transformation protocol (division of labor assignments, desired outcomes, community member aliases, and the date ranges for the PMBOK process groups) applicable to your project. E.D.A.S offers a unique way to organize email data based on activities instead of the traditional message focus provided in most workplace email clients. To assist with the reflection on your project, I have offered some guiding questions that correspond to different elements of the activity system. Using the model to explore your data, answer these questions as best you can. Please include a screenshot of the E.D.A.S model where possible to demonstrate your use of the visualization when answering a question. Email this completed questionnaire to rddivine@uw.edu when complete.

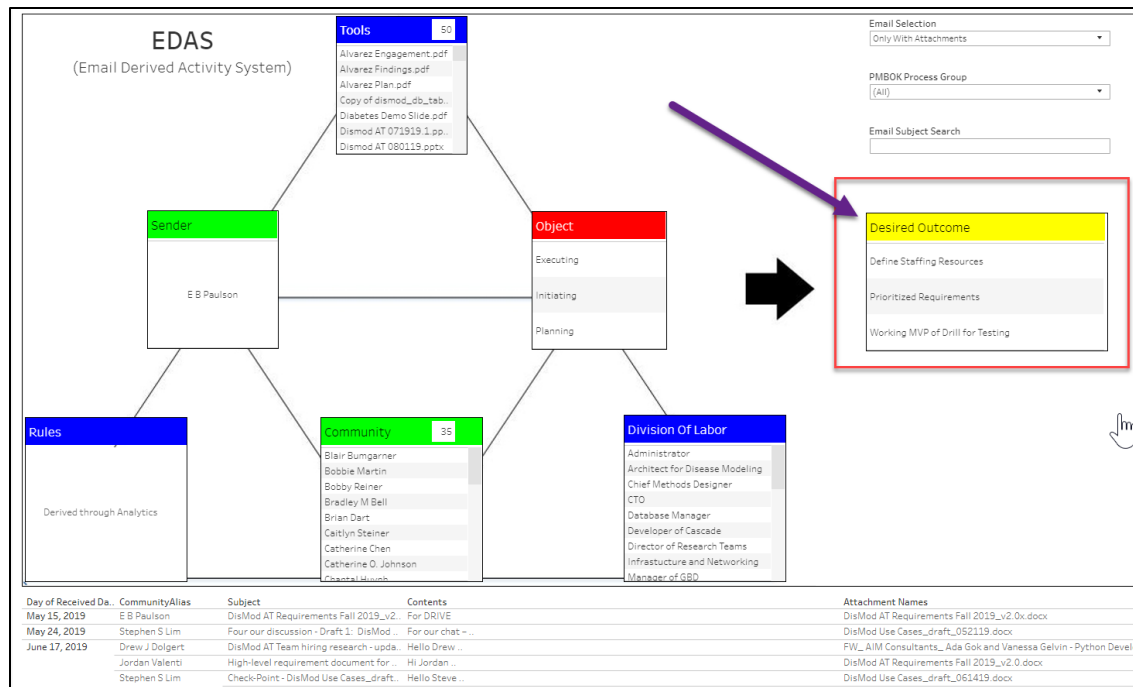
Access EDAS at <https://bitools.uw.edu/#/site/Transitional/views/EDAS/EDAS?iid=1>

Tools

1. Does the list of documents feel complete for the *planning* processes of your project?

Yes. As you can see in the screenshot, I could verify that during this time period of the project (bounds of data sample provided), the project stepped back from Execution to Planning, and back to Execution with a new team. The Desired Outcomes then gave a view of the artifacts in each of the project phases (planning/executing). Specifically, the views in the Viz tool reflect

- A. I was in need to staff up after 4 separate people separated from the project and IHME effectively stopping project
- B. Underwent a reset GAP (good average poor) Analysis to determine what state the code was in for all work-in-progress, as well as what was left to do and/or blocked by research design decisions,
- C. Execution of work toward the MVP with the new development team.



Although we defined a minimum viable product that we would develop, the beta versions we provided to the modelers were used to elicit more requirements for the backlog and helped change priorities. The Business Requirement Document used to bound the project, was then used to seed JIRA Project with initial requirements, but the new requirements added into JIRA during testing and discovery materially changed the value prop for the original requirement, leading to constant re-prioritization of backlog items to ensure we were always delivering the highest value work to the modelers (including work that was unknown to us at beginning of execution. Requirements gathering continued throughout the iterative development process as a test-and-learn process.

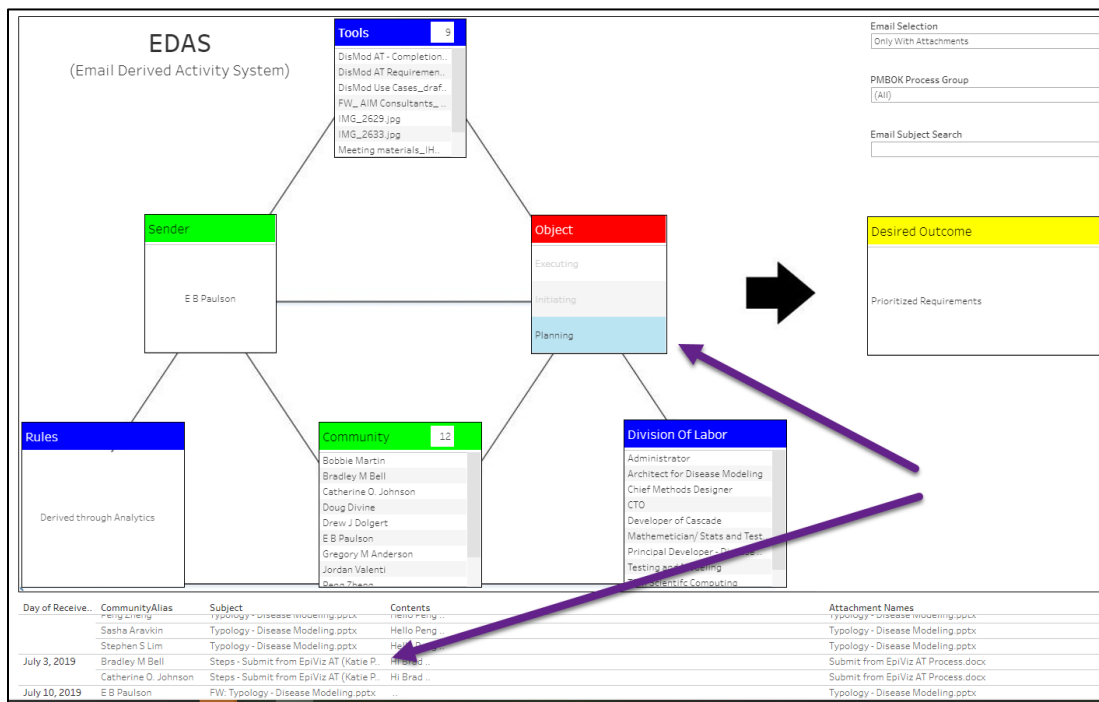
2. What documents seem to be missing?

There is no tracking of change in priority in the backlog of requirements, since once we entered Execution stage, requirements were managed in a cloud-based Requirements Management tool JIRA and Confluence, by Atlassian. I would expect to see adjusted schedules (forward looking) based on Discovery during iterative development and early testing feedback. However, I see communicating adjusted forward schedules were only given in PowerPoints to the Sponsor and Senior Stakeholders. Monitoring of the project schedule to reflect impacts by added scope was not managed closely, the casual recommunication of adjusted delivery dates cost Project Management and the team credibility with the Senior Management. Upon reflection, I understand that I was calculating future dates based on historical velocity for resources that had left the project and asking for new developers to meet future

delivery date that was immovable for the next round of production for the Global Burden of Disease. Also, much of the code done in the first attempt at execution prior to this data window, had to be pulled out and thrown away and reworked by the new team since system documentation was not robust and automated tests required too much effort to decompose and reverse engineer to identify the logic.

3. What planning documents might be shared across other process groups?

The process document (As Is and To Be) would have been useful in a clean document. I found emails with steps a modeler takes, or a future state-topography, but they were disjointed artifacts buried in emails. The information on modeler pain points and process improvements (VALUE Proposition) by Modelers and Testers were mostly captured in the test script clarifications in emails. The future state vision of the product and modeler experience with the future state DISMOD AT was principally in an email sent to me (which I can see I forwarded the email) and would have been a powerfully effective framework to use to get the new development team up to speed; this should have been in business analysis BRD, or artifacts supporting the revised BRD.



Test scripts were kept on personal drives and were silo'd and would have been an asset during requirements gathering and training up of new developers. This artifact was drafted by the research team testers and was not shared with IT/Dev/PMO. Lastly, I can see that Tech Spec and Design Docs were buried in JIRA/Confluence from the previous execution phase and were not sent to the new developers.

4. Why might certain documents not be in SENT email even though you know they must exist?

The docs were often decentralized as IHME projects rely too heavily on Confluence (Wiki) as a document management tool, which is not the core purpose. Had the planning documents been stored on a SharePoint site, and version controlled with check-in and check-out, everyone could have been sent links to the most current version of the artifacts, and old versions would not have been mined and circulated from historical archived emails.

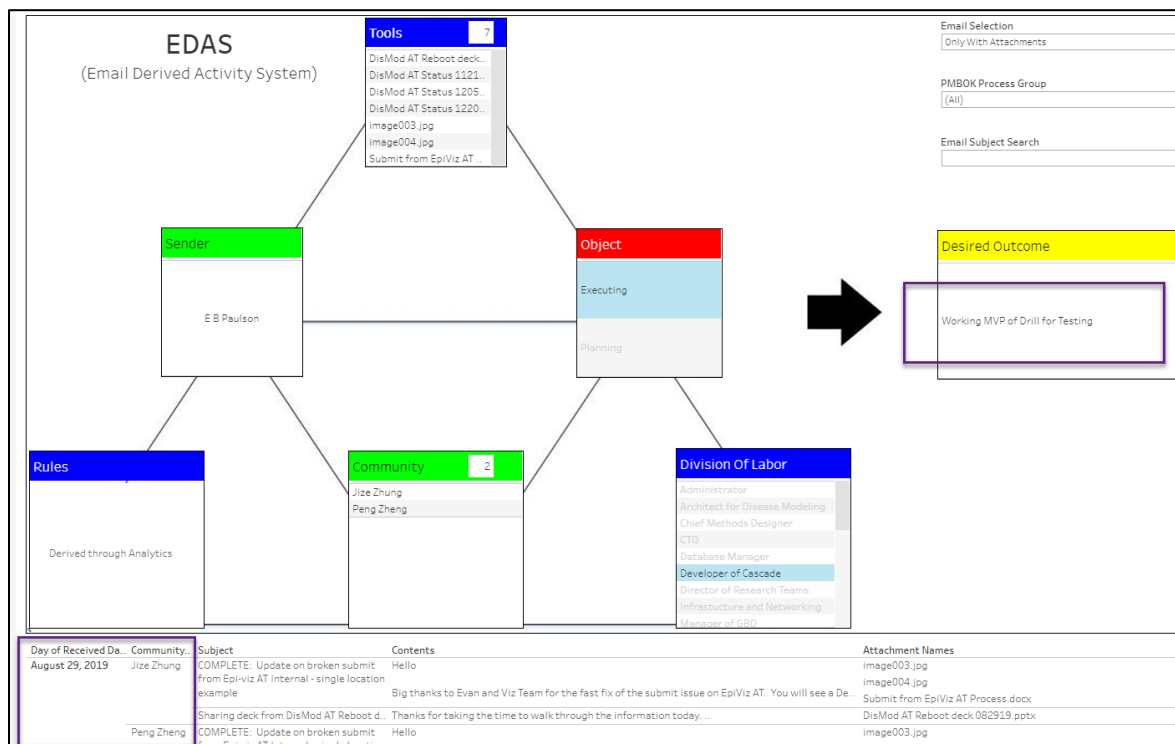
Culture at IHME can be very critical of early drafts; some project artifacts I circulated were drafts, and I also had a hard time chasing down early information because the community typically will hold back drafts from circulation in fear that items can be forwarded to Sr. Management, some who have a reputation of tearing things apart in front of large groups and embarrassing students and employees; the culture is punitive to public ideation or thinking out loud or drafts. Furthermore, there is conflict between Sr. Management and the IT and Project Management discipline. Very Sr. Mgrs have expressed that they think everything IT is easy and project management only extends development windows and cost money not covered in a grant. Sr. Mgmt also often stated they're only interested in when they can have their tools/products (timeline) and yet will have a low opinion of low quality work, even of a disclaimer that we are building an Minimum Viable Product and can make it more robust in a prioritized backlog after release. As such, Quality suffers for Timelines, leading people to cut their time developing quality specifications and/or code, in order to meet aggressive timelines.

An example was the Use Case exercise which was never finished early on which could have led to early innovation in the GUI and allowed modelers to weigh in early on a design that better matches their workflow; but without access to SME's and users, and under timeline pressure, a solution was delivered that was not well received by early testers.

5. Are correct community members receiving documents based on their division of labor? Example?

As all developers were not at meetings where design decisions were discussed, some decisions meant changing priority and added scope. I could review the flow of information back to the developers, and there was very little information in emails. Some decisions were communicated in backlog grooming or sprint planning meetings, but there was very little written (minutes of the status meetings) and sent back; meaning we had to rely on relationships and memories to keep

the team informed and aligned on priorities. This is an improvement opportunity.



Also, the planning phase, circulates artifacts widely in order to align the organization on scope and priority. Although Requirements are widely circulated, the sponsor is at the highest level of the organization, and he does not have time to review BRD/requirement artifacts. Instead, he calls weekly meetings to brief him on the progress towards a minimum viable product, and then challenges stakeholders, researchers, and developers on what the solution will need to do to be widely used and adopted. This leads to verbal discovery and agreements which may not always be properly documented and traced in a decision log. If decisions are made in a status meeting during execution, other community members may not receive the information until the new iteration is released and testing-triage identifies the disconnect. This is very inefficient. A decision log would be a useful shared tool, rather than have to rely on status to be given downward for the status meeting given upward. The primary sponsor prefers to get information in a face-to-face presentation rather than read artifacts, requirements, training docs or status decks circulated by email. Having a CEO sponsor who will not delegate decisions slows the communication between community members and can lead to false-starts and delay in the project.

6. What opportunities might this information provide to improve communication?

Challenge the sponsor to delegate decision making to community members who are more available for elicitation of requirements and management of the RAID log for the project OR, accept the culture rather than fight it – embrace demonstrations that show rather than tell decisions on methods and process and discovery of new requirements.

The new reality of distributed teams and use of Zoom for work at home, has allowed me to include more community members in status and design discussions and the team is more aligned and current and informed on priorities; also, they're engaged early in the 'feasibility' and propose alternative solutions that we can build and support, rather than take marching orders for how to do something quick and easily with guidance from a Sponsor or stakeholder who knows something is right when he sees it.

7. Are there multiple tools being used for a single purpose? Is this problematic or expected? Why?

The Business Requirements Document (BRD) that defined the Minimum Viable Product set scope and must-have and nice to have features. However, design decisions often led to changes in scope and expectations, but no acknowledgement of impact to timelines. Once we entered execution phase, requirements were managed in the Atlassian Tool, rather than treat the BRD as a living document to manage scope and timelines. Yet, we reference back to the requirements throughout the project and many assume this is the BRD which the community aligned upon at the start of Execution. The sponsor (during execution demo/status) frequently added scope without understanding of risk, complexity, and timeline impacts. Status meetings were used to manage scope and this information was often in PowerPoint documentation, or meeting minutes, but never made it back into planning and requirement management tool Atlassian/Confluence/Jira.

The system of record for requirements is JIRA, but there are no artifacts or links to JIRA in my emails.

8. Are there any variations in the tools that might cause issue with the project?

Scope and requirement priority decisions were not being managed in the requirement management tool Atlassian. Decisions affecting scope/timeline/quality became noted in status meetings and this led to conflicts between teams at IHME on value, scope, and timelines. There was no single source of record for Risks/Assumptions/Issues/Dependencies that was shared across the entire community but was merely used by the Project Manager to trace requirements back to the original MVP and manage expectations of Sponsor/Stakeholders.

9. Might similar documents have differing distribution channels? If so why?

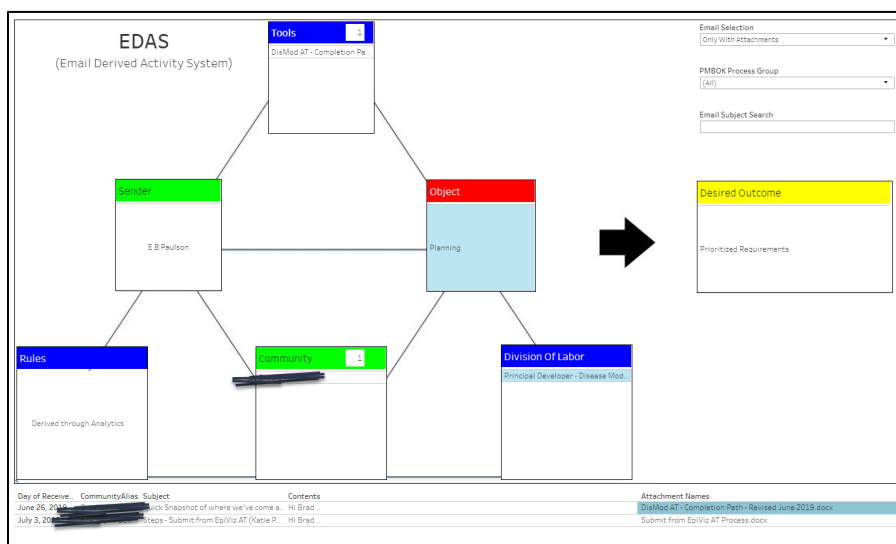
I like to communicate status to Sponsors and Stakeholders on WHAT/WHY (who will benefit from this function) and keep them out of the HOW to do something. Many times, they would recall someone else built something similar, but rarely would this do anything but slow down the project; a few occasions expedited design and development, but overall, it only slowed down delivery and negatively impacted schedules. SO, design docs went to developers and architects for one use, and I see some forwarded to training and research modelers. But this information was intentionally only shared verbally to Sponsors and Stakeholders in an effort to let developers do their job and keep division of labor out of other people's job(s)/task(s).

Status document and minutes (where design decisions, new requirements were approved, and priorities changed) were not communicated back down to all divisions of labor but stayed rather high-level in the community members.

10. What is one thing you learned because of the way email data was presented in the visualization?

Status was communicated upward, often driving conversations which resulted in decisions on priority and additional project scope. However, these scope and design decisions affecting the project were not communicated effectively down to all community members across all divisions of labor and this has led to expensive miscommunication and delays that don't always surface in testing and triage.

Working in a place with so many developers from different backgrounds and experiences, there seems to be many opinions on how to do something better; and this has led to conflict. I do see I isolated a very smart person from being disruptive to meetings. I should have engaged him more often and enforced rules of engagement in our community, rather than be passive.



Community

1. Who was included in the email *community* that was unexpected?

What surprised me is who was missing – the researcher modelers who were testing are not listed in the community which means I am not communicating with them directly but through proxy. This is an opportunity for me to facilitate bi-directional communication. Although Marlina joined for the executing phase, she is the principle product owner and drives development priorities and grooming of requirements to get the work ready to develop. Her preferred channel of communication with me is through our Slack Channels (which shares across members for the project development), and face-to-face meetings/calls. We also manage the sprint planning together, but very little makes it into email since we share screens and collaborate online. The sponsors and stakeholders for this project prefer to communicate via email and have rejected Slack; the younger and lower-level team members have the opposite preference of Slack and Zoom or Face-to-Face, over email.

2. What might this tell you about the exposure of certain project artifacts?

A project reset Completion Path (GAP analysis detailing if each original requirement for MVP was delivered Good/Average/Poor quality, and what requires rework. Our definition of done got lost as we delivered a low-functioning version, and Sponsors heard something was done/complete, then lost memory of the V1.0 required rework or enhancements to make something release worthy. The Requirement Document did not sync with the expanded backlog being built in another Tool (JIRA/Confluence); the BRD was a word document that circulated well through email to convey information, but the JIRA cloud tool was dynamic and license/seats were limited and not universal across the DisMod AT project community so changes managed in JIRA were not effectively communicated to the entire community and across all divisions of labor.

3. Were any known members of the project *community* excluded from email communications when important artifacts were circulated? On purpose? On accident?

Yes. Drafts shared through email often omitted Sponsor (direct or via an administrator) due to his desire for high quality specification and his history of aggressive questioning (with intent to help or abuse, unclear).

Also, on accident – decisions on design, changes in scope or functionality were not communicated down to the testers, but it was implied that the information would trickle down from stakeholders of each labor division; this did not happen and will be managed by the project manager going forward.

4. What impacts did these inclusions or exclusions have on the project *community*?

Many delays and false starts. Often, models would fail because decisions on default settings were made and changed, but not communicated. These changes can be very frustrating to a user and do not always show up in testing triage. This led to many wasted cycles analyzing results that could have been known to be invalid IF decisions had been communicated to all community members in a more efficient manner to all involved and not just management/sponsor/stakeholder levels.

Division of Labor

1. Were members of the project *community* adhering to their roles?

For the most part, yes. Some were responsible for methods, and some were responsible for data, or generating results. Some were responsible for the compute environment and others for the GUI. There were conflicts when mathematician/architect would challenge the way the Subject Matter Experts were defining the design.

2. Were they overstepping their bounds and potentially interfering in the work of others?

Occasionally, yes. Drew would get involved in the mathematics, and the coding of the cascade, and used the opportunity to criticize the architecture of the entire cluster infrastructure, network, job management system, methods, and scientific algorithms used by research teams. It led to exclusion, and omission of important information to avoid conflict and unwanted debate.

Rules

1. How do various social *rules* mediate interactions and communication between community members involved in the project?

A team member who separated early in this evaluation time window, would step out of his role, and often tell others what they were doing wrong; or that there is a better way. This led to disharmony and others excluding him in email threads, myself included.

IHME has an adversarial relationship between the academics/researchers, and the IT/Infrastructure/Technology teams. Sr. Management makes it know that the product is NOT the code, but the data and insight. Tech is merely a service and not seen as a strategic partner at IHME. If you want anything done by IT, you go to the top, make your case, and get the blessing of Sr Management; middle management is not empowered or supported to make many decisions. The project manager (from IT/Tech) does not have an audience with Sr. Management because he's not from the Research/Academia side of the organization. Questions are asked in front of a group of Stakeholders and Sponsors, and the decision is top-down. There is little authority in IT/Tech to do anything without

permission. The organization did away with a Tech PMO, CTO, CIO – Infrastructure reports to CEO, and the DisMod-AT Project reports through a different Sr. Manager on the Research side of IHME – this causes delays when the project only has 30 minutes every 2-4 weeks with the Sponsor to provide status, negotiate design decisions, manage scope and timelines. So, the RAID log becomes very large and rarely is current or shared.

2. How are you expected to communicate across company divisions? Is there any evidence that the expectation is being met based on the presentation of data?

I am an aggregator of issues and scribe of decisions. I then can be lazy and let the stakeholders take the communication back to their divisions, or I can document minutes and decisions and email back everyone else involved in the project.

Furthermore, turnover is extremely high both in the project (an unfunded mandate) and at IHME as a whole. This means that in a 4 year project (of which I've managed for 2 years), many decisions and knowledge has walked out the door. Keeping the managers informed is most important as they carry the knowledge forward and get new team members up to speed and informed on decision and direction.

3. How are other companies expected to communicate with you?

Usually going above me and having management direct me. Feedback comes from above, not laterally or upward. Email is my primary communication channel if my phone is not with me. Email forces other companies to frame their need/ask clearly, and I will respond in email. This is my preferred channel to avoid losing information verbally through a phone or zoom call.

4. Who is the client and who is the provider?

I see my community as my client, and I'm the aggregator of ideas/scope, and a facilitator of project status and verifier of value proposition. Ultimately, the modelers (testers) are my client – we're building this tool for them and not necessarily to give Sr. Management a flexible tool that can reverse-engineer data to a result that can make donors and IHME a nice political press release that may influence public policy and further investment.

5. Whom must you keep informed? Whom does you protect? Who protects you?

I spent a lot of time keeping the Developers informed of priorities and help get them unblocked on any issues they encounter. I protect the developers from being pulled into meetings where needs are being defined. My manager protects me now, but previously, only my development team and testers would protect me.

6. What violations would jeopardize your standing within a multi-company *community*?

No agenda for meetings and no delivery of status or issue/decisions.

7. How might a violation of these norms and *rules* affect the progress of the project?

Broken communication and unclear priorities will lead to false starts or failure.

General Impressions

1. What did you learn using E.D.A.S to reflect on your project?

I realize I need to include more people in status and decisions in the RAID log, rather than keep it in my silo to help only me trace requirements.

I realize my project reset was an effective communication tool – for truth and reconciliation but mostly since the concepts of MVP and an enhancement backlog had not been properly socialized at IHME; leading to varying definitions of done, and accusations of disingenuous status reports (deceit) by developers.

I did not adjust timelines with added scope, nor effectively communicate this upward or downward.

Also, I used historical velocity to have a new team estimate points for future work, and communicated these new delivery dates and milestones, which was a waste of time for all and appeared as another missed deliverable; negatively impacting the team’s reputation and morale.

I was able to realize I needed a standardized naming convention for my project artifacts. I even renamed some for different divisions of labor, which seems odd now as context could be included in the email description to introduce the artifact content.

I would like to enforce a document repository for checking in/out documents for version control – and then circulate a link in an email rather than an attachment – but still be able to see details for the artifacts that were linked/embedded in the email communication. This could also solve the BRD/JIRA/Confluence silos for requirement management – once in Execution, I often manage prioritization of requirements on a HUB page or staged JIRA sprint, and circulate the Hyperlink to the JIRA page within an email body.

2. What functionality would improve the experience?

This would have been easier to align with SDLC phases/milestones/artifacts.

Integration with a project RACI and seeing where I aligned with the communication channels and division of labor. I had a RACI at the start of the project and it’s very different now. Perhaps I would get more insight if I knew the people who were accountable for certain tasks actually got my email status directly or indirectly from a manager/stakeholder or other project team member.

	Theo	Brian	Caitlyn	Kimberly	Chris	Roles				
	Customer/ Modelers	Technical Project Mgr	PM (CentComp)	DBA (EDM)	Sponsor	Model Tester, Supporting Architect	AT Core Developer	Solution Architect, Principle Dev	Sasha Mathematician, Cascade Architect	Evan Viz (UI Dev)
Elicit Project Requirements	C	A	C	I		R	R	R		C
Provide Technical Feasibility		I		C		C	C	R		C
Document Unprioritized backlog of Req'ts	A	A or R	I	I		C		R		
Communicate Prioritized Requirements										
Establish Priority of Requirements		A				C	I	R		
Design Releases	I	R	C	C	I	I				
Sprint Release Notes	I	R	I	I	I	I	I	C		I
Milestones and Dates	C	R	I	C	C	C	A	A		C
Scrum Master- sprint planning to break down Dev Ready stories and epics into sprint tasks		R				C	C	A		C
Agile product owner - backlog Grooming to Get EPICS/STORY Req't's DEV READY - Ticket quality check before sprint planning		R				C	C	A		C
Design User Interface Req't's Wireframe	I		C					I		C
Build User Interface	I	A				C	C	C		R
Incorporate modeler feedback on UI	C	I				C	C	A		
Document Testing Plan	I	R						C		C
Perform Testing	I		I					I		
Test User Interface - Facilitate Modeler testing and feedback	C							I		
Approve Final User Interface/Sign-off	R							I		I
Design Technical Solution	I	I	I				A	R		

Regarding your tool – after navigating through the pyramid, I wanted to go back but couldn't find the control to 'start over.' This is particularly important since I'm given the ability to remove/hide emails. The screen real-estate for the 'filtered' emails was too small and could not be resized, forcing me to scroll up and down and up and down. I would like to see a longer list so I could view how many versions of a like-kind attachment were circulated.

Expand beyond attachments to linked document (hyperlinked) in JIRA or SharePoint repository.

The screenshot shows the EDAS interface with a central flow diagram and a list of email activity at the bottom. The flow diagram includes components like 'Tools', 'Sender', 'Object', 'Rules', 'Community', and 'Division of Labor', leading to a 'Desired Outcome' box. A red arrow points to the 'Desired Outcome' box with the text 'SHOW MORE ROWS so I don't have to scroll and squint.' The email activity list at the bottom shows columns for 'Day of Received', 'Community Alias', 'Subject', 'Contents', and 'Attachment Names'.

3. How might you use this for work if you could easily render a PST file for any email folder?

At the start of each phase of a PMBOK project, this would be a good exercise to see who is being included, excluded, who has knowledge that may leave the project, and who should be new delegates to ensure continuity on the project.

If someone is being ignored by a community, how can these relationships be warmed – a team icebreaker? Or, is the person's skills not aligned with the needs of the project which is best to know early and address for everyone's benefit and happiness.

Identifying my own engagement behaviors can help me identify and address implicit bias in my own methods of communicating. Is this person too busy? Too young? Too critical? Remind me of a previous colleague? And are my assumptions valid. A good team means being included and including others, building trust and an environment for collaboration and growth. A high-functioning team does not just happen – it's not organic – sometimes managing a project means nurturing communication channels and advocates in different divisions. Finding workarounds through networks between divisions. And being organized and consistent for all as a leader.

APPENDIX F – TABLE OF KEY CONTRADICTIONS

Chapter	Page	Contradictions	Type	Node(s)
4	54	Two scopes for the same project - which is accurate?	Primary	Tools
4	56	Observed community versus ideal community	Tertiary	Community
4	57	Community member not performing assigned labor	Secondary	Community and Division of Labor
4	59	Community member violation of norms and rules	Secondary	Community and Rules
5	91	Lack of rules governing time and workflow dependencies	Tertiary	Rules
5	91	Lack of rules governing scope creep in design modifications	Tertiary	Rules
5	91	Lack of rules enforcing timeliness of DevTech's output	Secondary	Rules and Division of Labor
5	93	Basecamp vs. Wrike	Primary	Tools
5	93	The role and responsibility of InVision	Primary	Tools
5	94	The role of the Exec Level % Complete Report	Primary	Tools
5	94	Community makeup of CollabCorp	Primary	Community
5	94	Community makeup of ClientOrg	Primary	Community
5	95	Approval flow for interactive wireframe design review	Primary	Rules
5	95	Requirements originate and stored in Wrike system	Primary	Rules
5	96	CollabCorp's labor responsibility to the design process	Primary	Division of Labor
5	102	Recognition and implementation of ClientOrgDeployProcess.pdf	Primary	Tools
5	102	Seven versions of status documents create source of truth confusion	Primary	Tools
5	103	Community makeup of CollabCorp - role of company leaders / stakeholders	Primary	Community
5	103	Community makeup of ClientOrg	Primary	Community
5	104	Tool describing a division of labor not enacted by all three organizations	Secondary	Tools and Division of Labor
5	105	The inability of the Exec Level % Complete Report to mediate rules on status	Secondary	Tools and Rules

VITA

Doug Divine is a PhD Candidate in Human Centered Design & Engineering at the University of Washington. His research focuses on technology assisted reflection and workplace communications. He has held multiple positions in project and product management and is currently Director of the Central Finance DATAGroup and Global Operations Support at the University of Washington.