Chapter 2. "We need to figure out how to do better!": Opportunities for UX Professionals in Project-based Organizations – An Activity Theory Analysis of a Technical Design Project

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Abstract. The discipline of UX is most often explored through the usability of products designed to reach a consumer or end user. Less attention has been dedicated to understanding the contextual and situational advancements of the tools and methods that enable project-based design teams to achieve their design objectives most effectively. Our research uses an activity theory approach to model and embed reflective methods and tools as part of the project management lifecycle so that project workers might identify areas of contradiction or tension during the project and pivot to rapidly improve them.

The case study presented in this chapter examines a project-based organization (PBO) responsible for the design of a new commercial client website integrated with a back-end content management system (CMS). We conduct several data extraction methods using an activity theory approach, including a new method of analyzing a project worker's email and attachments. This new method aims to highlight potential areas of contradiction that might emerge through communications and artifacts used across the five process areas of project management, defined in the Project Management Body of Knowledge (PMBOK). Although our case study is historical in nature, our approach provides an application of multiple data extraction methods for in-project reflection and demonstrates the reflective assistance that a UX professional could bring to both the lifecycle and results of a design project.

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 team as they look to bring a new product to market. Every project that Sebastian joins is a unique configuration of workers that must collaborate 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 modifications to certain project mediators could make a difference in the success of future projects.

The role of the UX professional is typically focused on commercial products, with research and design initiatives targeting the needs of end users. The role is less commonly associated with efforts to research and adapt internal tools and methods used by project professionals during the development of those commercial products. Our research focuses on UX in work practices. We specifically focus on project-based organizations (PBOs) that navigate the episodic work associated with product design (Hobday, 2000). We demonstrate through our 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 collaborative project work. Although we focus on the role of a UX professional, we acknowledge the longstanding interplay between UX and technical communication (Redish & Barnum, 2011). Our focus on the UX professional does not exclude similar contributions that could be made by technical communicators in the workplace, as the theoretical and methodological underpinnings of this work are common to both disciplines. Our primary objective is to demonstrate the importance and efficiencies of integrating a role with a strong background in activity-based observations, artifact assessment, communication analysis, and user-centered collaboration with the more defined practices of the project management lifecycle used to deliver new products. We utilize the UX researcher role as a focal point because it is a role that is recognizable within the workplaces that comprise our case study.

Teams require tools and workflows to deliver new products to market. The efficiencies and usability of those tools and workflows require the same level of attention that a UX professional might commit to commercial product designs. Our research uses an activity theory approach to model and embed reflective methods and tools as part of the project management lifecycle. Finding ways to surface, analyze and optimize how tools and procedures are used by a unique configuration of project workers is a UX challenge, one that if met, could have a cascading effect on the downstream usability of project designs. As a window into our work, we present a case study of a project-based organization tasked with the design of a CMS integrated website for a commercial

client. We introduce a multi-method, activity-based approach to the analysis of this project. Triangulating modeled results from three different data extraction methods, we demonstrate how the identification of key contradictions between the expected features of a project and the observed features of a project, can surface recommendations for improving the flow of project activities. Although our study is reflective in nature, our approach provides a method for in-project reflection and demonstrates that reflective assistance by UX professionals during the lifecycle of a project has the potential to not only improve a specific project's design, but can also help identify systemic issues persisting throughout the entire project ecosystem. The process of identifying and understanding project-based contradictions, we 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 project-based work.

■ 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 academic approaches to teaching UX with the skills being demanded in the workplace. UX professionals 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 & Beecher, 2016). Ongoing research is dedicated to finding efficient ways to sequence UX methods and activities to align more effectively with project management, especially agile methodologies (Kuusinen 2015; Kuusinen & Väänänen-Vainio-Mattila, 2012;). The primary focus of both academic and professional research agendas, however, seems to focus on the skills needed to improve consumer-based products for end users. Little, if any, exploration of the UX role in improving internal work practices has been conducted. This is especially true in the work of software development projects that 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. A study by Muhhamed Sajad and colleagues (2016), compared seven popular project management applications against IEEE Standard 16326-2009, which outlines specifications for project management plans covering software projects. The authors found that only 63 percent 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 percent of the features outlined by the standard are not covered by project management tools commonly used in industry. These absent features are routinely accommodated by project tools

created specifically to fill an operational or communication gap within a project. Further, many tools are 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 (Engeström, 2000) to the preferred flow of work. UX professionals are uniquely qualified to identify and mitigate these contradictions.

Our research leverages activity theory because it provides an orienting framework and modeling method capable of coordinating, collecting, assembling, reflecting, and learning from work-related activities and the communication artifacts that memorialize them over time. This theory has shown value in assessing engineering systems (Collins et al., 2002), fixing communication flows (Spinuzzi, 2013) and analyzing interconnected workflows like those found in healthcare settings (Engeström, 2000). Beyond this, activity theory has been proposed as a productive framework for understanding team interactions in project-based work (Zahedi et al., 2017). Aligned with this proposal, Benjamin Lauren (2018) has demonstrated how activity theory can be used to analyze the management of team change in a technical firm. Lauren's work bridges the field of project management to that of technical communication, which has a long history of exploring work practices using activity theory (see, for example, McNely et al., 2015, and Spinuzzi & Guile, 2019).

Our research specifically leverages Yrjö Engeström's (1987) activity theory method for modeling activity systems, which has been instrumental in reflecting on, modeling, and improving complex configurations of work. His methods of data collection includes interviews, document analysis, and direct observations of routine workplace activity. Like Engeström, we utilize interviews and document analysis as part of our project-based investigation. Direct observation of episodic work, however, is challenging since the motivated activities are temporary, persisting only long enough to complete the deliverable at hand. Our methodological modification therefore 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. Leveraging workplace email as an archived source of project communications, activities, and tools, we use the modeling capacity of activity theory to make hidden work visible. Making such work visible, UX professionals are presented with the opportunity to assist project professionals in modifying project tools and workflow to increase efficiency. Our activity system modeling effort 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; instead, we choose to restrict our modeling because we are interested in helping individual project workers reflect on their own work. Our approach 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.

Case Study: CollabCorp's Interactive Wireframe Design Project

The subject of our case study is a seasoned project manager employed by a small technical design company near Seattle, WA. Conditions of the project worker's participation required complete anonymization of all names and organizations discussed and observed within the study. Once the study was completed and the resulting narrative developed, we anonymized all names to the satisfaction of the participant and their employer. The primary organization of our study involves CollabCorp, a small but growing project-based organization, employing about 700 employees. The company focuses on projects and engagements that assist clients with process improvements through digital transformations. Our case study details a specific project that CollabCorp was hired to manage for a regional company that we will call ClientOrg. We will refer to this project 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 wireframes 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 we will call DevTech. This case offers a unique opportunity to study the execution 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.
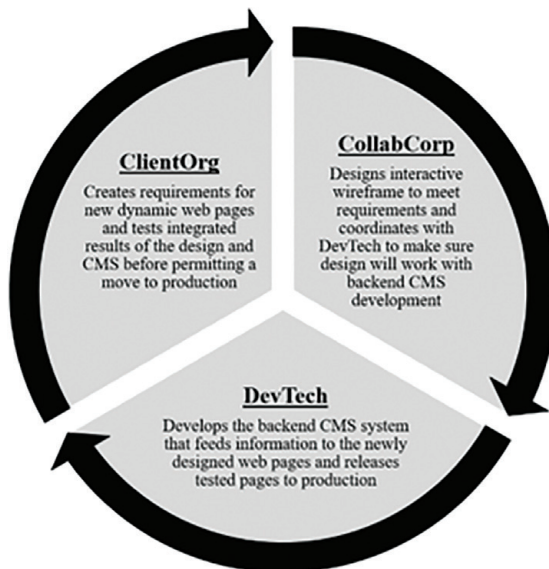

Figure 2.1. Collaboration configuration for ProjectWeb.

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. We 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.

▮ 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). Our case study uses all three methods of data extraction. To demonstrate the unique contributions each method makes within our case study, we deliver a resulting activity system model for each extraction method and discuss its value in making work visible. As each of the three models are developed, we compare them to identify contradictions. Resolving such contradictions, we contend, makes possible the learning and improvement needed to advance the work of the organization.

Our 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. 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 a document or artifact analysis, we 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 of key project indicators traditionally found in the planning documents of a project that are easily mapped to an activity system model to represent the ideal version of the project as it was conceived during planning phases. Discovering such ideal versions of a project are useful for understanding the difference between planned work and realized work.

As an alternative to direct observations, which are impossible after episodic project work has been completed, we employ an assessment methodology that uses the project worker's email to model activity systems of specific phases of work based on the Project Management Body of Knowledge's five process areas (Divine & Zachry, 2018). Transforming key components of email into

activity-centric models, we leverage workplace communications as empirical traces of work providing rich insights into past work events. Triangulating the data modeled from the empirical assessment of emailed project communications with a reflective interview of the project worker and the data modeled from the project's planning document or charter, it becomes 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 also provide the very evidence UX researchers need to improve the efficiency of the project tools themselves.

■ 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 represents 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 our 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) and it is through reflections on, and the resolution of, the contradictions that learning occurs and opportunity for improvement emerges.

▪ The Subject (Gabe B.)

Following our methodological approach, the human *subject* of the activity system is a single individual. Our 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.

▪ 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 wireframes 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.

▮ Data Extraction Method for Reflective Interviews

To demonstrate the value each data collection method contributes to the study, we 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 we progress through our analysis. To begin we present the analysis associated with our 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 Daisy Mwanza's Eight Step Model (2002), which provides structured guidance to activity system modeling. This method facilitated guided reflection on the project phase being discussed, allowing the project worker to remember salient aspects of the project based on their memory alone. We thematically analyzed the answers and modeled them by applying an activity system analysis.

▮ Interview Finding: The Mediating Tools

We asked Gabe during our 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 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.

Interview Findings: 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 positions 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 that 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 delivering the CMS

and configuring its code to work with the emerging designs provided by Collab-Corp. Jasper coordinated offshore resources to deliver the CMS configurations needed to support the interactive wireframes.

▉ Interview Findings: The Mediating Rules

Our analysis to this point has yielded few notable contradictions based on the interview data collected from Gabe. The activity model, thus far, seems 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, 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.

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 2.2.

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 our analysis, we 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 by which time they 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.
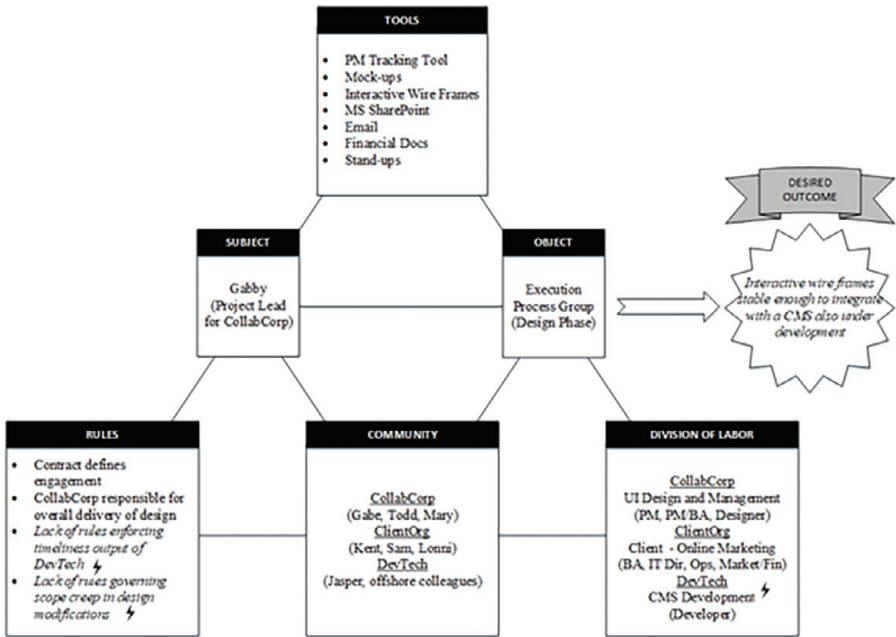
Figure 2.2. Activity system analysis of reflective interview with Gabe B.

▉ 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, we 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 we conducted our

interview. We were 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.

Document Analysis Findings: The Mediating Tools

The transition document provided us with links to 10 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 we compared the activity model we generated from Gabe's reflective interview, interesting primary contradictions (tensions occurring within a single node of the activity system) began to emerge. We began to see acknowledgments 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 we 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. We also learned about a system called InVision that 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.

Document Analysis Findings: 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 difference 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.

◼ Document Analysis Findings: 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 our 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 may have salvaged the project from its ultimate demise.

■ The Activity System Model Based on a Central Project Document

To recap, we 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 2.3, 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 we were able to identify key primary contradictions between the project that Gabe remembered through guided reflection and the same project memorialized in a transition document. Reflecting on such contradictions enables a project worker to identify tools, rules, and roles that could be adjusted to make the project more efficient.
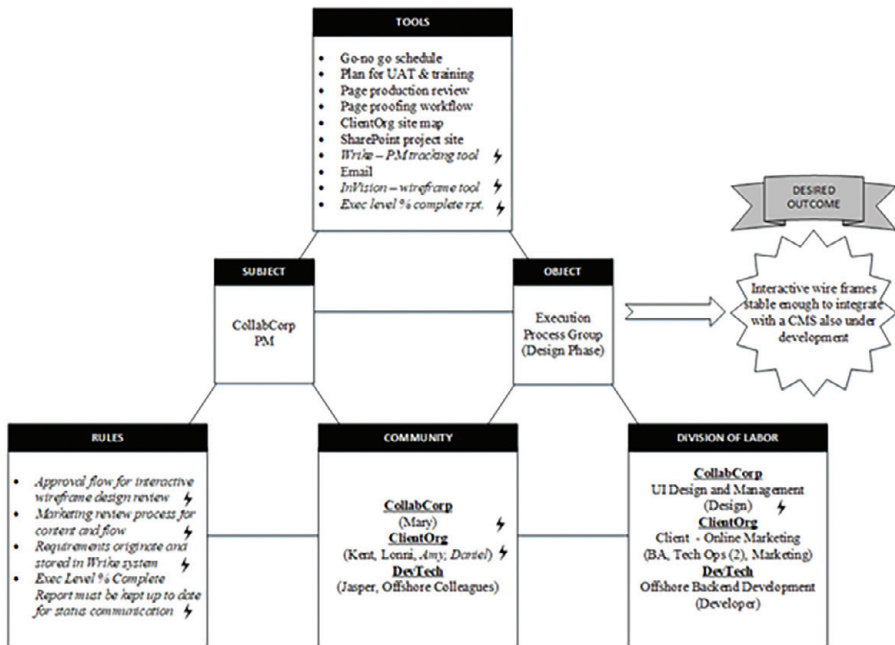

Figure 2.3. Activity system model of a central document for ProjectWeb.

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 usability perspective, but also 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 still 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 our study, the project finished,

and the companies are no longer associated. The project professionals of Collab-Corp, however, take on new clients daily and recycle many of the project tools and resources we have reviewed in our study. Without an agenda to constantly reflect on the mediators of projects (tools, rules, and roles) project professionals like those in CollabCorp run the risk of recycling failed mediators in future projects.

◼ Data Extraction Method for Email Analysis

We now turn our 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 within 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.

Our analysis of 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 included in 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 excluding 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 PM-BOK 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 we saw when we modeled the components of the central transition document for ProjectWeb. Email signatures can be leveraged to determine roles or a division of labor of individual community members, but the results should be confirmed with the project professional participating in the analysis since the responsibilities of a role can be misleading when comparing common position titles across organizational cultures. The derived activity system for Gabe's SENT email pertaining to ProjectWeb is modeled in Figure 2.4. At first glance one can see how robust the results from an empirical analysis of email can be. Next, we triangulate this model with the two models derived previously to identify additional contradictions that enrich Gabe's growing assessment of ProjectWeb.
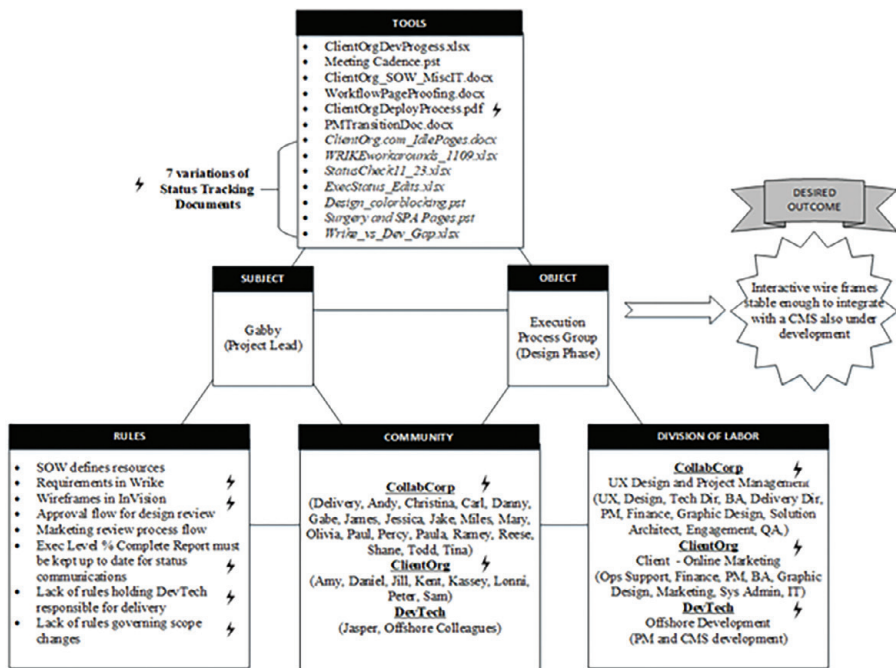

Figure 2.4. Activity system model of Gabe's SENT emails for ProjectWeb.

▪ Email Analysis Findings: 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. We 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. We have seen several of those tools included in our analytical work 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 is consistent with their use on a project. By focusing on the attachments in email an analyst 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 our case study, Gabe's SENT folder contained 13 unique attachments representing tools that he 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 represented workflow rules, and eight 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 that presented interesting data related to the division of labor that we will discuss later. The fourth artifact representing workflow was the emergence of a tool called ClientOrgDeployProcess.pdf. This artifact offered 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 represented a primary contradiction in the role of a critical tool, highlighting 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 seemed to be a direct attempt to mitigate the lack of rules that Gabe mentioned during his interview, a situation that ultimately led to the project's demise. The fact that the workflow diagram was missing the needed rules, and it was not recognized as a fatal problem, 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 to have 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. We were unable to identify indicators that also tied the requirements to the InVision system used for interactive wireframe development. This variability in the status and requirement sharing tools is a strong indication that the 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 resetting 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.

Email Analysis Findings: 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 2.5. 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 suggests 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 so 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 2.5. A comparison of community members by data extraction method.

We 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 follow 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.

Email Analysis Findings: 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 remaining. One requirement that was 43 percent complete might take five days to finish, whereas another requirement at 78 percent 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 percent complete, a requirement in UAT would be 75 percent, 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.

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 within the organization 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.

Reflective Insights from a Focus on Tools

In the area of tools, a key recommendation would be 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 seven 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.

We 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.

▊ Reflective Insights from a Focus on Rules

In the category of rules, where some are explicit and others implicit, we 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.

■ Reflective Insights from a Focus on Community

Finally, in the categories of community and division of labor we 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 contributing 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 was not 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?

■ 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 [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.

■ Conclusion

The method we 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 highlight emerging contradiction during the project lifecycle and 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 insight reinforces the notion expressed throughout this paper 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 we plan to leverage the information learned through our 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 our 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. This approach is well aligned with Torkil Clemmensen and colleagues' suggestion (2016) that activity theory can provide an enhanced understanding of user experiences that have broader social relevance than simple interaction studies. We contend that 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 likely improve cross-organizational use. Even if Sebastian had conducted a historical analysis as represented by our 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.

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