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Organizational Coordination and Communication:
The Development and Testing of an Integrative Model

A dissertation submitted in partial satisfaction of

the requirements for the degree Doctor of Philosophy

in Communication

by

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Without the patience and guidance of my committee this would never have been completed and I cannot thank them enough for their support. Additionally, I have to dedicate this to my amazing kids, Nolan and Eva, and their mother, Julie. The kids spent way too many weekends watching me write instead of adventuring and Julie was always there to make sure they felt loved. Now it is time to go to Disneyland!

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ABSTRACT

Organizational Coordination and Communication:

The Development and Testing of an Integrative Model

by

Eric John Zackrison

This works identifies, and attempt to redress, four problematic issues in the organizational coordination literature. First, by distinguishing *coordinating* as the overarching process, *coordinating mechanisms* as the structures that are brought to bear, and *coordination* as the *in situ* interaction. Second, it explicates and distinguishes coordinating mechanism from coordination, and re-frames the myriad mechanisms in past research into three levels of consciousness specified by structuration theory. Third, it proposes a model relating structures (mechanisms) that affect practices (coordination) to outcomes—all within organizational members' ongoing streams of activity and interaction. Fourth, we theorize organizational coordination as a distinctly communication phenomenon. The validity of this model is explored using mixed methods research conducted in two Phases, The first included in-depth interviews and some observations of meetings and interaction. The second involved the creation, administration and analysis of a survey instrument. Result generally supported the theoretical underpinnings offered in the model, though did suggest some needed refinement of the model.

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Chapter One – Literature Review

Coordinated activity arguably is the defining characteristic of organizing and organizations. As McPhee and Iverson (2013) note, organizations' "signal power" derives from the coordinated work of members and stakeholders, the coordinated operations of many units, the coordinated delivery of resources and personnel to core processes, and the coordination of organizational products and services with markets and societies (p. 109). Yet, organizational coordination concepts are somewhat muddled, and that the communication aspect is under-emphasized. This dissertation research is an attempt to primarily do three things. The first is to bring some clarity to the study of organizational coordination through the development of a communicative model. The second is to use mixed methods research to check the veracity of the model and to measure some of the relationships. The third is to examine the findings from this research to inform the model specifically, the study of organizational communication and coordination more broadly.

Therefore, to address the first concern I discuss, in turn: (a) four particularly problematic issues with the prodigious research on organizational coordination; (b) two prominent theoretical perspectives on coordination; (c) mechanisms of, underlying assumptions about, and influences on organizational coordination; (d) distinctions among coordinating, coordinating mechanisms, and coordination; and (e) and propositions and a model of organizational coordination. I then move into the methods of study, the results of the study, and finally the discussion of those results.

The thesis, which underlies and unifies these efforts, is that organizational coordination is a distinctly communicative process that is essential to the understanding of how organizations function particularly in times of change. In brief, the argument and analysis unfold as follows across the five sections noted above. I urge definitions of

*coordinatin*g as the overarching process, *coordinating mechanisms* as the structures that are brought to bear, and *coordination* as the *in-situ* interaction, thereby bringing precision to constructs that have been conflated. I also seek to resolve problems related to the variety of coordinating mechanisms and types of organizational coordination in the extant literature I review by explicating what a mechanism is and what coordination is, and by re-framing the myriad mechanisms in past research using three levels of consciousness specified by structuration theory. This approach clarifies how types of coordination and types of coordinating mechanisms proposed by others interrelate, and it enables a more parsimonious model.

The resulting model I introduce and discuss (formalized in propositions and a visual figure) spotlights coordinating in organizations, including initial interdependencies and uncertainty, organizational and knowledge mechanisms, and routines—all influencing coordination, with possible reproduction or reshaping of those mechanisms, as well as intended and unintended organizational outcomes. Hence, I place coordinating at the core of the process, through viewing organizational coordination as influenced by and implemented through coordinating mechanisms, and through interaction (re)creating those mechanisms.

Furthermore, instead of confounding coordination with coordinating mechanisms, coordinating, and outcomes, I propose a parsimonious set of relationships from structures (mechanisms) that influence practices (coordination) that lead to outcomes, including reinforcement or reshaping of those mechanisms—all in organizational members' ongoing streams of activity, meaning, and interaction. In this way, I theorize organizational coordination as a distinctly communication phenomenon. I provide several examples of opportunities for integrating coordination and communication in relevant communication-

based theories, with the potential to benefit organizational coordination and communication scholarship. I end by summarizing the responses to the four problematic issues about conceptualizations of, and research on, organizational coordination and communication.

Problematic Issues in Organizational Coordination Research

Coordination in organizations has been a focus of study since the turn of the last century (Taylor, 1916) and still is today (Okhuysen & Bechky, 2009a). Studies of organizational coordination also can be found across many disciplines, including economics (Berninghaus & Ehrhart, 2001), computer information systems (Bardram, 2000), linguistics (Gazdar, 1980), management (Endstrom & Galbraith, 1977), organizational behavior (Okhuysen & Beckhy, 2009a), psychology (Kraut, Lewis, & Swezy, 1982), sociology (Sutton, 2008), and communication (Ballard & Seibold, 2003, 2004; McPhee & Iverson, 2009). Scholarship on coordination covers a broad range of contexts and levels of analysis. Micro-level interpersonal interactions include how individuals utilize material signals in an attempt to coordinate everyday actions (Clark, 2005), how individuals negotiate conversations in interpersonal interactions (Hubbard, 2000; Vallacher, Novak, & Zochowski, 2005), role-coordination in teams (Bechky, 2006), and relational and organizing micro-dynamics in teamwork (Humphrey & Aime, 2014). Increasingly complex meso-level contexts include urban planning (Tornberg, 2012), coordinating regional or international inter-agency relief networks (Miller, Scott, Stage, & Birkholt, 1995), and the coordination of crisis response (Topper & Carley, 1999). And broad macro-level contexts consider multi-national and interorganizational coordination (Alter, 1990; Cray, 1984; Endstrom & Galbraith, 1977), as well as market, marketing, and supply chain coordination (Buvik &

John, 2000; Celly & Frazier, 1996; Gerstner & Hess, 1995; Kim, Stump, & Oh, 2005; Raju & Zhang, 2005; Zhao, Liu, Yang, & Sadiq, 2009).

With this rich diversity, however, come four problematic issues: (a) much prior work lacks shared explicit conceptual or operational definitions, (b) types of coordination overlap and contradict each other, (c) coordination is often a secondary aspect rather than a central concern, and (d) coordination—as treated in the organizational literature—receives little attention by communication researchers. As I explicate these issues below, I limit the review to work that is specifically related to organizations and that advances the understanding of organizational coordination as distinctly communicative.

Much prior work lacks shared explicit conceptual or operational definitions. The first issue in organizational coordination research is a lack of a shared explicit definition. In general, theorists often assume an understanding of what coordination means and may not offer an explicit definition (Endstrom & Galbraith, 1977; Kellog, Orlikowski, & Yates, 2006; Larsson & Bowen, 1989; Perrow, 1961; Sutton, 2008). Even some of the most prominent coordination scholars do not always explicitly offer a conceptual definition (Bechky, 2006; Gittell & Weiss, 2004).

Even when definitions are provided, they cover a wide range of conceptual definitions, reflecting disagreement in how to define coordination and disagreement about its constitutive elements and functions (as Table 1 shows). Definitions range from the very simple conception of Simon (1947) “The adoption of all members of a group of the same decision” (p. 8) to the more complex view of Rico, Sanchez-Manzanares, Gil, and Gibson (2008) that “Coordination in work teams is an emergent phenomenon involving the use of strategies and behavior patterns aimed at integrating and aligning the actions, knowledge, and

objectives of interdependent members, with a view to attaining some common ground" (p. 163). There are differences in whether coordination is, as Bailetti, Callahan, and DiPietro (1998) contend, a structure that is "a configuration of actors (individuals or groups of individuals—units in an organizational situation) who have interdependent responsibilities to create, modify and use an array of shared work objects" (p. 238), or a process, as Okhuysen and Bechky (2009a) argue, "coordination, the process of interaction that integrates a collective set of interdependent tasks, is a central purpose of the organization" (p. 463). More difficult to reconcile is whether coordination is necessarily a measure of something that is successfully accomplished, as Malone and Crowston (1990) indicate: "the act of working together harmoniously" (p. 358), and as Ballard and Seibold (2003) propose—"coordination can be defined as the collective accomplishment of individual goals through a cooperative process" (p. 401)—or whether it is more generally an intention or attempt, as Rico et al. (2008) state: "with a view to attaining some common ground" (p. 161).

INSERT TABLE 1

Types of coordination overlap and contradict each other. A second problem (related to the first) is a conflation and vagueness of terms surrounding coordination. Such terms include integration (Lawrence & Lorsch, 1969), cooperation (O'Brien, 1968), collaboration (Salmon & Faris, 2006), and congruence (Cataldo, Wagstrom, Herbsleb, & Carley, 2006). Also, coordination, cooperation, and collaboration are used interchangeably (Vlaar, van den Bosch, & Volberda, 2007). A vast array of subcomponents also have been presented to deal with specific types of coordination or to present coordination in a particular way. For example, coordination is conceived of as either existing in some aspect of the organization before interaction or as being created in situ—for example, administrative

coordination versus expertise or dialogic coordination (Faraj & Sproul, 2000; Faraj & Xiao, 2006). Another difference is whether coordination is considered as being either internal to or external to the group, like Bardram's (2000) intrinsic versus extrinsic coordination. Other conceptualizations examine whether coordination is based in knowledge, in interactions, in routines, or in some other construct. Knowledge-based conceptualizations include cognitive coordination (Foss & Lorenzen, 2009), expertise coordination (Faraj & Sproul, 2000), and the anticipation component of implicit coordination (Rico, et al., 2008). Interactive conceptualizations include relational coordination (Gittell, 2001), communicative coordination (Bardram, 2000), the dynamic adjustment component of implicit coordination (Rico, et al., 2008), discursive coordination (Minnsen, 2005), and activity coordination (McPhee & Zaug, 2000). Routines have long been understood to be a component of coordination and have a vast literature (see Becker, 2004 for a full review). Other conceptualizations include Bardram's (2000) temporal coordination that examines the role that perceptions of time have on coordination, an idea also addressed by Ballard and Seibold (2003, 2004), and in Bailetti et al.'s (1994) coordination ensembles, or how groups arrange themselves around objects.

Coordination is often a secondary aspect rather than a central concern. A third problematic issue in organizational coordination studies is a lack of focus on coordination as the primary concern. Instead, it is examined as a secondary variable, such as affecting leader member relations (Ilgen & O'Brien, 1974), as an intervening variable when examining leadership style on productivity (Hewett et al., 1974), or as control mechanism when analyzing the transfer of managers (Endstrom & Galbraith, 1977). Some of the second problem above, lack of consensus on its meaning, has been a byproduct of many definitions

offered in studies in which coordination was of secondary interest.

Coordination requires greater attention by communication researchers. Communication is acknowledged in the earliest organizational coordination work either explicitly, noting the importance of feedback and mutual adjustment, or implicitly, through plans and programming, which require communication to establish and maintain (March & Simon, 1993; Thompson, 1967). More recent organizational coordination work continues to recognize the importance of communication. For example, Okhuysen and Bechky (2009a) identify the role of communication in some coordinating mechanisms, such as the monitoring and updating component of roles, and in integrating conditions for coordination. But these works are external to communication research, and by non-communication researchers.

Ironically, however, communication researchers have not paid much attention to coordination in the senses discussed above, nor have they emphasized the communicative aspects specific to organizational coordination. When organizational communication scholars have engaged coordination, their primary focus has been on communication and organizational constitution—that organizations emerge from and are maintained by communication processes. Emphasis in that vast literature is given to the coordination inherent in communication and, by extension but only secondarily, to organizational coordination (Cooren, Taylor, & van Emery, 2006; McPhee & Zaug, 2000). Work in communication also has examined collaboration (see Lewis's 2006 review), including commentary on organizational coordination. Other prominent communication scholarship on coordination has not been much concerned with organizational processes, but rather with coordinating language, interpersonal interaction, or social ties (Fusaroli & Tylen, 2012; Pearce & Pearce, 2000).

In the remaining sections, I respond to these four problematic issues by (a) reviewing relevant theoretical perspectives on organizational coordination with an eye to identifying problems and applying strengths, (b) identifying key assumptions (structuration, crucial related concepts, and conceptualization of coordinating, coordinating mechanisms, and coordination), (c) advancing arguments for three overarching coordinating mechanisms (routines, knowledge, and organizational) that help resolve problems in the literature, (d) emphasizing a communication perspective, (e) proposing an integrative model and relevant testable propositions, (f) testing aspects of that model through the use of mixed methods, and finally (g), offering suggestions for further work into this complex area.

Two Prominent Theoretical Perspectives on Organizational Coordination

The scholarship on organizational coordination is prodigious. Thus, I selectively discuss two overarching theoretical perspectives—contingency models and organizational design; and coordination paradigms—followed by a detailed discussion of assumptions and definitions. The intention is to provide the foundations for a framework and model that redresses limitations in, and integrates central concepts from, these previous theoretical approaches to organizational coordination.

Contingency models and organizational design. The work of Malone and colleagues (Crowston, 1997; Crowston & Kammerer, 1998; Malone, 1987; Malone & Crowston, 1990; Malone & Crowston, 1994) and Bailetti, Callahan, and DiPietro (1994) figures prominently in the modern landscape of organizational coordination research. Extending the traditional design/contingency paradigm that was dominant for much of the last century (e.g., March & Simon, 1958; Thompson, 1967; van de Ven, 1976), these scholars develop a rich taxonomy of contingencies and mechanisms affecting coordination

effectiveness (with some focus on information/communication technology). This research acknowledges the complexity of potential interdependencies, but emphasizes distinctions (Malone & Crowston, 1994) and categorizations (Bailetti, Callahan, & McClusky, 1998). Furthermore, much of the work is technology-centric and lacks much focus on the agency of organizational members. Finally, the coordination processes identified acknowledge a wide range of and levels of interdependencies but do not distinguish coordinating mechanisms from coordination, a distinction central to the analysis I develop in the assumptions and model sections later in this paper.

More generally, there are three important criticisms of the contingency approach to organizational coordination. The first is that the number of possible interdependencies and contextual differences makes it nearly impossible to develop an exhaustive catalog of matched organizational situations and coordinating mechanisms. A second critique concerns the dearth of discussion about how organizational members might actually identify, access, and implement these mechanisms. For example, what happens when the mechanisms are not used well (van Fenema et al., 2004) or even function counter to group and organizational goals (as analyzed by Rice & Cooper, 2010)? The third criticism focuses on a lack of specificity about how the coordination mechanisms work, especially for specific contexts. Without that knowledge, further theoretical development is hampered (Okhuysen & Bechky, 2009a).

However, the contingency/design approach also offers two benefits for the study of organizational coordination. It identifies possible coordinating mechanisms from which a typology of matches between situation, coordinating mechanisms, and the attainment of positive coordination can be developed. Additionally, even though much of this work has

focused on very specific instances and the ways to manage interdependencies, these still allow for broader theoretical implications in extrapolating from the instances studied to broader theoretical concerns. For example, Crowston (1997) examined coordination problems in software design and how specific organizations dealt with them. In interdependencies where task assignment to the proper engineer is important, utilizing a mechanism focused on identifying expertise is more important than other coordinating mechanisms. This benefit of the contingency/design perspective on organizational coordination informs the concept of knowledge mechanisms that are key to the assumptions and model I offer.

Coordination paradigms. In a major review of the organizational coordination literature, van Fenema, Pentland, and Kumar (2004) identified three paradigms of coordination theory. The contingency paradigm views coordination as processes or structures that can and should be manipulated to increase organizational effectiveness within varying contexts. The relatedness of structure and process paradigm recognizes that process and structure are not necessarily mutually exclusive, and includes theories that focus on their interrelationships. These theories conceive of structure much more broadly than does contingency/design and are relevant for the structuration theory assumptions I make in the next section. Structure includes more than just procedures, plans, manuals, and control mechanisms; rules and resources, mental models, collections of knowledge, and shared meanings are included too. These are the internalized aspects of structure that organizational and group members draw on as generative of action. The crafting inner and outer world paradigm views coordination as beginning with the individual. Coordination is accomplished through coherence, or forming a unified whole, in the connection between individuals' outer

worlds (structures and processes that exist outside the individual) and inner worlds (how individuals interpret and interact differently with those outer worlds).

Distinguishing among the three paradigms yields insights into how the conceptualization of organizational coordination has changed to accommodate deeper understandings than in early contingency/design work, especially the roles of agency and interaction in producing coordination. The relatedness and crafting paradigms identified by van Fenema et al. (2004) also supply a basis for the more communicative focus in coordination research and for a structurational approach. In particular, the relatedness coordination paradigm includes concern with how structures affect interaction and how interaction, discourse, and conversations create structure. The crafting paradigm concentrates heavily on the communicative nature of coordination and embraces the ways that organizations and coordination are created through interaction and communication. The assumptions and model I offer in subsequent sections are consonant with these two paradigms.

Mechanisms of, Underlying Assumptions about, and Influences on Organizational Coordination

Coordinating mechanisms and integrating conditions. Perhaps the most cogent analysis of the organizational coordination research literature to date is provided by Okhuysen and Bechky (2009a). I review their work in some detail. While I differ from them in important respects, portions of their analysis are extended in the present model as well as in the structuration theory tenets and other assumptions that underlie it. Okhuysen and Bechky (2009a) first concentrate on five "coordinating mechanisms": *plans and rules, objects and representations, roles, routines,* and *proximity*. They subsequently identify three

overarching “integrating conditions” that those coordinating mechanisms must accomplish to bring about coordination: *accountability, predictability* and *common understanding*. I discuss the five coordinating mechanisms and the three integrating conditions in that order. Okhuysen and Beckhy’s work moved the current understanding of coordination forward in several ways. First is their separation of the vast collection of mechanisms into several categories that helped inform my argument for organizational mechanisms and routines. Second, the presentation of the three integrating conditions allowed for a clearer understanding of the knowledge mechanisms I present as well as how the mechanisms might interact. Finally, they call attention to the communicative aspect of organizational coordination, even if only implicitly.

Plans and rules are aspects of the formal organization that are required for organizing. They contribute to coordination through defining responsibilities for tasks, allocating resources, and developing agreement. Objects and representations facilitate coordination though direct information sharing, scaffolding (structures established by a group to allow reference for future work), acknowledging and aligning work, and creating a common perspective. Roles are the expected behaviors associated with a social position in the group or organization, and help coordination through monitoring and updating, substituting (as members become more aware of each other’s roles they can fill in for each other), and creating common perspective. Routines are established patterns of behavior that members rely on for action, without having to consciously process those behaviors. They help

coordination by increasing task completion and stability, allowing for hand-off work, bringing groups together, and creating common perspective.

The final coordination mechanism identified by Okhuysen and Bechky (2009a), proximity, has two components, visibility and familiarity. Visibility depends on physical co-location and aids coordinating through monitoring (by supervisors, as well as of others' behaviors) and updating, which is the increased ability to realign or gauge task progress in high visibility environments (for discussions of the effect of audio and visual co-location on knowledge and coordination, see Archea, 1977; Kraut, Fish, Root & Chalfonte, 1990). (Clearly, in the contemporary context of ubiquitous organizational ICTs, the notion of visibility takes on a more general, and both more and less constrained, aspect; see Rice & Leonardi, 2013). The concept of familiarity focuses on the knowledge one person has about another individual or situation. It aids coordination through an increase in the ability of members to anticipate others' actions and respond appropriately, by knowing where the stores of knowledge necessary for coordination lie, and by increasing the levels of trust among members. This conceptualization of familiarity is also central to the theory of transactive memory (Lewis & Herndon, 2011).

As noted, Okhuysen and Bechky (2009a) contend that each of the five coordinating mechanisms above can be accomplished through what they call three integrating conditions: accountability, predictability and common understanding. Integrating conditions are the means through which organizational members jointly perform workplace tasks that are interdependent. Accountability directs members' attention to whomever has responsibility for particular aspects of an interdependent task, and functions to coordinate action formally and in emergent fashion through vertical authority (directives and reporting) as well as lateral

structures that may be formal (e.g., status updates) and informal (e.g., interactions). Predictability facilitates coordination to the extent to which members are aware of task parts and timeline—and thus, can predict ensuing task activity. Predictability is enabled through formal mechanisms (scheduling) and emergent means (familiarity with others' knowledge and preferences, as acquired through interactions with them individually or collectively). Common understanding aids coordination by affording organizational members with shared perspectives on whole-part relationships (e.g., parameters for a task and how each member's work is part of it). Common understanding is reflected in task knowledge, knowledge of relevant members, and context knowledge. It can be enhanced through formal and planned methods (e.g., manuals, assembly drawings) and emergent interactions among members.

Okhuysen and Bechky (2009a) hint at the role of communication in some of the five coordinating mechanisms, such as the monitoring and updating component of roles. Curiously, they offer roles as the salient aspect rather than communication even though, as Bechky (2006) argued, communication is the actual process of enacting those roles. Bechky emphasizes that role structures cannot be taken as givens; they are evident in the streams of action of role occupants—actions that prominently include communication and interaction. Okhuysen and Bechky (2009a) more explicitly note the role of communication in the three integrating conditions for coordination, both in formal authority structures (e.g., directives, setting schedules, manuals) and in informal lateral structures (meetings and conversations). I extend those notions greatly in my model, and before that in the structuration theory tenets and other assumptions underlying it.

In the remainder of this section I explicate assumptions and key concepts in three areas that will be foundational to the model I propose in the following section. The first area

incorporates a structuration theory premise concerning organization as constraining and being (re)created by interaction. The second involves the centrality of two key concepts commonly associated with organizational coordination (interdependencies and uncertainty). The third includes distinctions between coordinating, coordinating mechanisms, and coordination.

Underlying assumptions.

Structuration tenets concerning organizational coordination and communication. McPhee and colleagues (McPhee & Iverson, 2009, 2013; McPhee & Poole, 2001; McPhee & Zaug, 2000; Poole & McPhee, 2005; Poole, Seibold, & McPhee, 1985) argue for a conception of organization grounded firmly within Giddens' (1979) concept of structuration. Structuration is an outgrowth of a period of theory that embraced the role of human agency in the creation of our social realities, and was adopted and developed as a communication theory largely by the above group of researchers. Structuration identifies social systems, including organizations, as systems of human practice in which human activities are interrelated in various ways. This interaction is guided by structure that is composed of rules and resources. Rules are any principle or guide that tells people that draw on them the ways in which they can or should act; resources are anything that people use in action, including material like money or tools, or nonmaterial like skills and information.

A core concept of structuration is that as people draw on structural rules and resources in acting within a social system of practices, they perpetuate that system and reproduce the very structures that guide them. This can occur through perpetuating the system as is, or through transformation, which shifts the system, taking it in new directions. Every interaction within a system has two components: it produces the practices of which it

is a component and it reproduces the system and structure.

Communication theorists who embrace structuration theory recognize that humans have agency and are not strictly guided by outside forces; thus they assume that humans have distinct levels of consciousness, they are knowledgeable, and they are reflexive (Poole & McPhee, 2005). *Consciousness* has three levels. The first is *discursive* consciousness, which I can put into words and explain to others. The second is *practical* consciousness, which—like riding a bike—is difficult to impart in words, though I can put into action. The third is the *unconscious*, of which I are not aware but that nonetheless affects actions. This level includes the effects of my past actions, such as unrecognized fears, or attitudes, and beliefs.

Knowledge represents the ability of people to know much about their environments and resources available within that environment, allowing them not only to go about their day-to-day existence, but to know who knows what and where needed resources are located. However, humans do not just go through their day-to-day activities; they also *reflect* on that activity, making adjustments as needed to current action and to future planned actions.

Communication flows in organizations. In a structuration approach, organizations as social systems are both constituted through communication and in turn provide contexts for creating communication. One structuration conception distinguishes four types of communication "flows" essential for the constitution of organization (McPhee & Zaug, 2000). First, organizations typically draw a distinction between members and nonmembers through continuous communicative *membership negotiation*. Second, organizations reflexively self-structure through *communicative processes*, distinguishing them from mobs or neighborhoods. Third, organizations also *follow some manifest purpose(s)* which guides communicative processes of activity coordination. This third flow is especially relevant for

the present analysis. Activity coordination usually entails interactive episodes in which members who are aligned in an organizational unit and/or location adjust to germane acts of others and to situational constraints (McPhee & Iverson, 2013). Fourth, *organizations are embedded within a larger context*—another organization, community, industry, technological or legal trends, or society at large. Thus, organizations generate and are regulated by communicative processes of institutional positioning, such as negotiating through interaction with stakeholders and other institutions to establish status.

It is from this perspective that the current conception of not only organization but organizational coordination is derived. The re-constituting process suggests that the coordinating mechanisms that engender the coordination process are also (re)created in that very process. It is only through looking at the process as continual and iterative that coordination can be fully explored. The three assumptions about humans in organizations (they are conscious on several levels, knowledgeable, and reflexive) underscore that coordination is a human activity. The levels of consciousness indicate that the coordination of organizational members involves not only discursive knowledge and practical knowledge of the task, but is influenced by aspects not fully recognized consciously by the members. They do not act as parts of a machine with no knowledge or reflexivity as the earliest coordination theorists imagined, but instead reflexively adjust their future behaviors based on current interactions. Finally, the four flows offer two implications. First, they allow us to define what is and is not organization and thus what is and is not organizational coordination. Second, they place organizational coordination within a larger context, whereby it is affected by and affects that context.

Concepts influencing organizational coordination. As Okhuysen and Bechky (2009a) emphasize, interdependencies and uncertainty are central to conceptualizing the need for coordination in organizations.

Interdependencies. From a systems theory perspective, the actors, tasks, processes and organizations exhibit both weak and strong interdependencies (or tight and loose coupling) based on exchanges of various resources and outputs to accomplish particular goals or tasks (e.g., van de Ven et al., 1976). These resource interdependencies may be based on specific actor and organizational needs, goals, abilities, and processes. They include not only industrial resources like capital, parts, and time, but also less tangible resources such as emotional support, guidance, and information (Gittell, 2001). They also include responsibilities, linking group members with each other and with objects and actors outside the group, like design plans, customer needs, and test results (Bailetti, Callahan, & McClusky, 1998).

In the earliest coordination work these interdependencies were a measure of the level of complexities of reliance in order to accomplish the goals of the organization. Thompson (1967) identified three types of interdependencies (in order of complexity from least to most): pooled, in which one person's contribution may move the group forward, but the rest of the group does not rely on that person's contribution per se (e.g., harvesting fruit); sequential, in which one member's actions are required for another's to take place (e.g., assembly line); and reciprocal, in which the members rely on each other in a give and take process (e.g., cooks in a kitchen rely on the dishwashers for clean dishes and the dishwashers rely on the cooks for dirty dishes). Van de Ven et al. (1976) added a fourth level, team, which does not include the temporal aspect of sequential or reciprocal interdependencies, but

instead refers to those times when components work jointly and simultaneously (e.g., some kinds of sports teams). Crowston (1997) proposed three other kinds of interdependencies. Task to task interdependencies arise when one task is reliant on another being accomplished. Task to resource interdependencies include situations where a resource is required by a task, and resource to resource interdependencies are those situations where one resource depends on another. Other studies add different possibilities, including interdependencies specific to the construction industry (Hossain 2009), to the customer service industry (Larsson & Bowen, 1989), interdependencies in groupware (Andriessen, 2003) or between components of a system (Crowston & Kammerer, 1998), and peer-to-peer interdependencies (Cumming & Akari, 2005).

Previous literature on coordination recognizes the alignment of interdependencies as a core property of coordination. Though some of this work is overly simplified or unnecessarily complicated, it is important to recognize that in the absence of interdependencies there is nothing to coordinate. Not only are interdependencies different across context, they may change throughout the life cycle of a project (Adler, 1995). Interdependencies also may be sufficiently complex, ambiguous, and temporally lagged to make it difficult to even know what to coordinate, or to coordinate at a large enough level, in order to avoid or resolve dysfunctional processes. Indeed, without appropriate feedback and coordination, these interdependencies and dysfunctionalities become embedded, routinized, and nearly invisible, into unusual routines (Rice & Cooper, 2010).

Uncertainty. With interdependencies comes uncertainty such as, in the communication sense, divergences in meanings, as well as, in the pragmatic sense, who is responsible for what task when. Coordination is necessary to avoid or resolve that uncertainty

in order to accomplish goals. Much of the earliest work examining coordination drew its inspiration from finding ways to manage these uncertainties, such as those created by the introduction of large-scale railways by assuring proper time schedules and allowing for the planning of shipping and traveling (Beniger, 1986; Okhuysen & Bechky, 2009a). This interest grew as increased industrialization took hold. Much of this early work concentrated on design: first of work, then of management, and finally of the organization, in attempts to allow for increased management control (van Fenema, Pentland, & Kumar, 2004). Taylor's Scientific Management concentrated on ways that humans and their work actions could be more mechanized and efficient, thus reducing the uncertainty of production (March & Simon, 1993).

Developing at much the same time were theories of departmentalization (often called administrative management theory), including the work of Fayol, Gulick, and Urwick (March & Simon, 1993). This group differs from the scientific management school in their level of analysis. Rather than attempting to guide the specific worker through planning and training, they focused instead on the design of management systems that allowed for little uncertainty and near-complete coordination (or removal of the need for it). Building on early design theorists' attempts to plan formal elements to accomplish coordination, a substantial shift in focus began with March and Simon's book *Organizations* in 1958. Referred to by a number of names including contingency theory (Galbraith, 1973; van Fenema et al., 2004), organizational design theories (Okhuysen & Bechky, 2009a), and administrative theory (Thompson, 1967), this approach assumed that interdependent aspects of an organization could be planned and thus coordinated in order to reduce uncertainty. For example, Yates (1993) showed that new genres of communication, such as the memo, adapted from British

Empire administration, were central in improving control and coordination of the rapidly developing form of corporations in the early 1900s.

Contemporary scholars acknowledge that early contingency theory and research was simplistic in its assumption that all uncertainty within interdependencies could be eliminated, or that interdependencies could be designed down to simple, repeatable processes. However, scholars still focus on uncertainty as a primary concern for coordination research, and examine how levels of uncertainty require, and affect the use of and the effectiveness of, various coordinating mechanisms (e.g., Argote, 1982; Gittell, 2002; van de Ven, et al., 1976).

Distinctions—Coordinating, Coordinating Mechanisms, and Coordination

As noted above, the coordination literature conflates similar terms such as collaboration, cooperation, integration, and congruence. The more difficult part of conceptualizing coordination is not the confounding of it with differing terms, but differentiating between words with the same linguistic root, such as coordination, coordinate, and coordinating. Once these conceptual issues are worked out, it becomes easier to establish coordination as conceptually different from other similar concepts.

The difficulty in conceptualizing coordinating and coordination stems in part from how each is defined in the English language. Merriam-Webster.com defines coordinating as the present participle of coordinate, so that coordinating is "making arrangements so that two or more people or groups of people can work together properly and well, or as acting or working together properly or well, or as causing (two or more things) to be the same or to go together well." Thus, coordinating can be conceived of as both an act done to something else (i.e., making arrangements or causing…) or as an *in-situ* process (i.e., acting or working together properly). This definition of coordinate/coordinating does not bring much clarity.

Merriam-Webster.com defines coordination as "either the act or state of coordinating or of being coordinated or as a harmonious combination or interaction, as of functions or parts." Again, coordination, like coordinating, can be conceived of as something done to a group, as something a group does, or as something attained; as an act, a process, or a state. This is exacerbated in the literature as the two terms are so often misused and under-conceptualized. So, I propose the following definitions, which will be further explored below:

- *Coordinating* is the organizational process of applying coordinating mechanisms to attain higher extents of coordination, resulting in outcomes (expected and unexpected, intentional and unintentional, positive and negative).
- *Coordinating mechanisms* are those processes, structures, artifacts, or interactions that exist to facilitate coordination of a group, or of the organization, that generally exist "before" coordination, and that are either intentionally brought to bear or stored for use in situ.
- *Coordination* is the extent to which the in situ interactive integration of group(s) and/or organizational members' work activities is logical and coherent in managing interdependencies towards some goal.

To support these definitions, two key problems in previous literature must be addressed: coordinating and coordination are distinct concepts, and the process of coordination is conceptually, if not always empirically, distinct from outcomes. I also argue against (a) conceiving of coordination as a dichotomous variable (either attained or not attained), (b) assuming that the use of coordinating mechanisms is automatically successful in attaining appropriate extent and types of coordination, or (c) assuming that coordination

necessarily achieves successful or intended outcomes**.** In other words, no aspect of coordinating, or the internal relationships, is fully deterministic.

Coordinating and coordination are distinct. As noted, the literature is rife with confusion between the meanings of coordination and coordinating. Other than definitional difficulties, there are two additional issues in delineating between coordinating and coordination. First, I need to distinguish between coordinating as external to a group (i.e., the manager is coordinating that group by giving it direction on an upcoming task) or as internal to the group (i.e., the group has a high extent of coordination towards completing a task). This blending of external and internal was a constant issue in the earliest coordination research (e.g., design contingency, Thompson, 1967), and is an error in recent work as evidenced by the identification of both plans and mutual adjustment as coordinating mechanisms (Grote et al., 2008).

Second, I need to distinguish the boundary between the coordinating mechanisms and coordination (i.e., are instructions from supervisors a mechanism even when accessed by group members during a project?). Cheng (1983, 1984) brings some lucidity to this difficulty when he delineates between coordination, which he identifies as a measure of the articulation of unity of effort between contingent parts of an organization or group, and coordinating, which is the process of utilizing coordinating mechanisms to align those divergent parts of the organization or group around a particular task. Cray (1984) recognizes the same differentiation in concepts (though he still confounds the terms) when he writes that "the issue is not so much the type of coordination (coordinating) used, but the amount or degree of coordination. The primary consideration…is that the subunits be successfully integrated…" (p. 87). Though Cheng called for researchers to more clearly distinguish

between coordinating and coordination, the issue has remained (see, for example, Cumming & Akari, 2005; Janick & Bartel, 2003; and Vlaar, van den Bosch, & Volberda, 2007). More recently, Kraut, et al. (2005) make the same call for clarification, identifying coordinating as the attempt to manage interdependencies, and coordination as the resultant state of well-managed interdependencies (although note again here the confounding between whether coordination is a state or not). This manifests in the literature in the common use of both coordinating and coordinating mechanisms to mean the application of some structure to attempt to align interdependencies. To reduce this confounding I call for the term coordinating to be used to describe the overarching process and coordinating mechanisms to represent those structures that exist to facilitate the coordination of group and organizational members' interdependencies. (The use of the term "mechanisms" carries some risk of being associated with technological determinism and Taylorism. However, it has been so ingrained in the coordination literature that it is more fitting than alternatives such as processes or structures, which have structurational theory connotations).

Coordination and outcomes are distinct. The literature often construes coordination and outcomes as the same (Cheng, 1983, 1984). One possible reason is the difficulty in measuring coordination directly. Instead of coordination being measures as a manifest variable, it often has been measured as a latent variable, including such varied concepts as mutual respect, the timeliness of communication, and the frequency of communication (Gittell, 2002). The common conception of coordination as accomplishing some output logically leads scholars to include some aspect of goal achievement into the measure of coordination—such as including the success of the group in attaining some organizationally desired outputs (Cheng, 1984). These outputs can be measured as a level of quality (e.g.,

customers report Y level of satisfaction) and/or quantity (e.g., the group serviced X number of customers) (Argote, 1982).

A possible second reason for misconstruing outcomes as part (and thus an indicator) of coordination is the common assumption that the only valid goals for a group are the official organizational goals. Yet the success or failure of a coordinative action is in many instances and contexts a subjective perception (Martinez & Jarillo, 1989). The goals of the organization are not always as clearly defined as group goals. Perrow (1961) notes that whose goals take precedence changes over the life course of an organization, including administrative goals, organization goals, specific group goals, or some other goal. Depending on whose goals are being measured, the success or failure of a coordinated effort could vary drastically (Lehr & Rice, 2002).

Chapter Two

Propositions and Model of Organizational Coordination

In the previous section I re-conceptualized coordinating, coordinating mechanisms, and coordination as system, structures, and practice. I distinguished between coordinating, coordinating mechanisms, coordination, and outcomes to show how mechanisms (structures) affect coordination (practices) that lead to outcomes within organizational members' ongoing streams of activity and interaction.

As I note below, each of these types of mechanism works to align organizational members' meanings and practices, but this only occurs through the interaction of the members and the alignment of their interdependencies. As structuration theory argues, these structures both enable and constrain the actions and interactions of the organizational members. Moreover, those very coordinating mechanisms are themselves either reproduced or transformed through the ways that the members enact them in the actual coordination.

Further, I simplify the five mechanisms identified by Okhuysen and Beckhy (2009a) and the myriad mechanisms identified by Malone and colleagues into the three structuration theory levels of consciousness: discursive, practical, and unconscious. This allows for a comprehensive yet parsimonious categorization of coordinating mechanisms—and in a manner that enables us to understand their impact on coordination. The discursive level of consciousness aligns with organizational coordinating mechanisms, which are those mechanisms that are consciously created and/or brought to bear to attempt coordination. Practical consciousness aligns with knowledge mechanisms that facilitate coordination that organizational members are conscious of, but may not be able to fully explain how they are brought to bear. The final type of coordinating mechanism, unconscious, aligns with routines,

as it occurs when the above mechanisms become embedded in organizational members' practices and allows for action without thought or negotiation.

Thus, I explicate my proposed model through five components: 1) coordination itself, 2) organizational coordinating as both mechanism and outcome of coordination, 3) knowledge as both mechanism and outcome of coordination, 4) routines as both mechanism and outcome of coordination, and 5) organizational outcomes of coordination. Each is treated in turn next.

Coordination

I see at least five common errors when coordination is defined or operationalized. First, and typical of the older contingency approach, it is conceived of simply as a mathematical representation of the allocation and sequencing of tasks within a group (O'Brien, 1968). Second, coordination is operationalized as an outcome, such as measuring it as attaining quality of product, quantity of product, or efficiency of delivering product (e.g., Argote, 1982; Faraj & Sproul, 2000). Third, coordination is operationalized as a coordinating mechanism, such as asking if planning was well-conceived, schedules were clear and adequate, or if members have a shared cognition (e.g., Cheng, 1983; Gittell, 2002; Kraut, et al., 2005).

The next two errors confound conceptions that are peripheral with the coordinating process itself. Fourth, variables that are more descriptive of the context are included rather than those specifically coordinative in nature. For example, Cray (1984) includes how many functions a task group shares with another and how many other tasks the group must interact with. While these certainly influence the coordination process, they do so by increased interdependencies and uncertainties, which are already accounted for in the proposed model.

Fifth, other moderators may exist, but there is too little evidence to support them as needing to be included here. These include Gittell's (2001, 2002) concept of mutual respect and Hoegl et al.'s (2004) project commitment; although both may lead to coordination, a group need not like each other or be highly committed to the task to accomplish it. The operationalizations that seem to best measure coordination as it is conceived here include variables that measure *in situ* interaction, and the alignment of work (see methods section for more details).

Organizational Coordinating as Both Mechanism and Outcome of Coordination

Organizational coordinating mechanisms are the broadest category, but are easier to observe than the other mechanisms. They are created based on specific actions of an organization in an attempt to increase coordination. Three categories of such mechanisms include: structural coordinating mechanisms, conscious interaction mechanisms, and stored organizational coordinating mechanisms.

Structural Coordinating Mechanisms (*SCM*). SCM include those components of an organization such as rules, roles, and power structures that constrain and enable any interaction, including coordination. *SCM* are established at two points, through planning by the organization and through the interaction of organizational members. The first, planning, is well established in the coordination literature as both non-physical though observable (e.g., hierarchical arrangements, rules, and departmentalization) as well as physical (formal information systems, physical space design) (see Andriessen, 2003; Archea, 1977; Kraut, Fish, Root, & Chalfonte 1990; March & Simon, 1993; Tushman & Nadler, 1978). These are conscious decisions on the part of the organization to increase the coordination of its members. The second, interaction of members, follows from my discussion above of the

centrality of communication in both coordinating mechanisms and integrating conditions as well as the structuration of coordination. Through the interaction of members as they enact and experience the planning of the organization, these mechanisms are (re)created—a concept that will be further explored below in outcomes.

Proposition 1a: Uncertainty is positively associated with use of Structural Coordinating Mechanisms (SCM).

Proposition 1b: Interdependencies are positively associated with the use of SCM.

Proposition 2: SCM are enacted through communication.

Proposition 3: SCM are positively associated with extent of coordination.

Conscious interaction mechanisms (CIM). CIM involve direct interpersonal or group communication to any member of a group by an organizational member external to the group, with the intent to facilitate coordination of the group. These can occur in person or through mediated means like email. Conscious interaction coordinating mechanisms are similar to what March and Simon (1993) called feedback, or what van de Ven et al. (1976) referred to as group or personal mechanisms. However, it is not the same as the concept of mutual adjustment, which is identified by Thompson (1967) as occurring in the process of action. The difference is that mutual adjustment is something that occurs during group interaction or during coordination, whereas feedback, or personal and group mechanisms, like conscious interaction mechanisms, originate externally from the group. This measure is somewhat muddled in the literature as so much of the literature confounds this with either what is being conceived here as coordination, or adds measures that make it difficult to tell what is really involved. This latter is evident in Gittell's (2001, 2002) investigations of relational coordination. Her relational coordination measure includes aspects of interaction

between organizational members external to the group, but it also includes the timeliness and frequency of group interaction, which by the present conceptualization mixes coordinating mechanism with coordination. The same issue occurs in work by Grote et al. (2010) and others (e.g., Hewett, O'Brien, & Hornik, 1974). Though research shows the effectiveness of face-to-face interaction in improving coordination and output (Kraut, et al., 2005; Okhuysen & Bechky, 2009b; Young, et al., 1998), organizational communication has been increasingly well supported with mediated technologies (Rice & Leonardi, 2013), for example in customer support teams (Rathnam, Mahajan, & Whinston, 1995) and construction projects (Hossain, 2009). These organizational structures (as coordinating mechanisms) often function, or are intended, to reduce uncertainty. They have been found not only to be more common, but also more effective, in high uncertainty environments (March & Simon, 1993; van de Ven et al., 1976).

Proposition 4a: Uncertainty is positively associated with the use of Conscious Interaction Mechanisms (CIM).

Proposition 4b: Interdependencies are positively associated with the use of CIM.

Proposition 5: CIM are positively associated with the extent of coordination.

Stored Organizational Coordinating Mechanisms (SOCM). SOCM are artifacts created by organizations that do not require direct interpersonal interaction in the facilitation of coordination, but that still exist for that purpose. These include training manuals, budgets, memos, plans, databases, programming, or other mechanistic, formal, or impersonal artifacts (March & Simon, 1993; Thompson, 1967; van de Ven, et al., 1976), as well as any information (physical, digital) that the organization has created and stored to increase coordination. These require some agency to access on the part of the group or organizational

member, and may have at one point been part of CIM (e.g., during training employees are given an orientation manual), but now there is only interaction with the object if the organizational member seeks it out. These mechanisms interact directly with resource knowledge mechanisms (see below) and are only as effective as organizational members' ability to access, understand, and use them.

Proposition 6a: Uncertainty is positively associated with the use of Stored Organizational Coordinating Mechanisms (SOCM).

Proposition 6b: Interdependencies are positively associated with the use of SOCM.

Proposition 7: SOCM are positively associated with the extent of coordination.

Organizational coordination mechanisms as outcomes of coordination. Early work assumed that these organizational mechanisms were set forth by management, implemented, accepted, and endured until later organizational changes in procedures. It is now understood that these structural components may be more or less appropriated through the organizational members' interactions, and be more or less adjusted in alignment with the intentions of the organization (Desanctis & Poole, 1994). A prime example is Bechky's (2006) investigation of roles in temporary organizations such as film crews. Members attained a high extent of coordination quickly through the use of roles that were (re)established through the use of joking and other interactions. Other work supporting this conception of organizational mechanisms as created through interaction found that these structural components can be influenced by network relationships, which are more readily established in collocated teams as opposed to distributed teams (Hinds & McGrath, 2006), or conceptions of time that emerge differently depending on group experience and make-up (Ballard & Seibold, 2003), among others.

Proposition 8a: Extent of coordination may reproduce or reshape structural coordinating mechanisms.

Proposition 8b: Extent of coordination may reproduce or reshape conscious interaction mechanisms.

Proposition 8c: Extent of coordination may reproduce or reshape stored organizational coordinating mechanisms.

Knowledge as Both Mechanism and Outcome of Coordination

Based on such diverse concepts as tacit knowledge (Brockman & Anthony, 2007), transactive memory (Hollingshead & Brandon, 2003; Lewis & Herndon, 2011; Ren, Carley, & Argote, 2006), expertise (Stewart, Walker, Hunt, & Kumar, 2010), and implicit coordination (Rico et al., 2008), knowledge as a coordination mechanism includes facets of coordination for which actors utilize modes that are neither completely without thought and based on repeated patterns, such as routines (explained below), nor are fully conscious (like organizational coordination mechanisms). I emphasize two of those knowledge mechanisms: resource knowledge and relational knowledge, as both involve communication.

Resource Knowledge. Resource Knowledge includes information, skills, and materials. When group members know who knows what, and how to get that information, they are able to perform better (Faraj & Sproul, 2000; Olivera, 2000). Knowledge about resources allows members of the group to identify the location of needed resources, whether that means knowing whom to approach in order to obtain materials, in what database information is shared, or which group member has information about a given task or decision. This is not only true about knowledge internal to the group but also knowledge of

the environment. For example, boundary spanners in a group have knowledge about where to access external resources (Tushman, 1977).

Proposition 9a: Uncertainty is positively associated with the use of Resource Knowledge.

Proposition 9b: Interdependencies are positively associated with use of Resource Knowledge.

Proposition 10: Resource knowledge is positively associated with the extent of coordination.

Proposition 11: Stored organizational coordinating mechanisms interact with resource knowledge such that higher levels of both lead to an even higher extent of coordination.

Relational Knowledge. Relational Knowledge allows members to better access those resources that require interaction. Knowledge does not have to be about facts, but can be about how others in a team interact (a central aspect of transactive memory; Hollingshead, 1998). As groups interact, they learn more about each other. In subsequent interactions they have a better idea about not only who knows what, but also how others in the group might react. For example, Faraj and Sproul (2000) and Kraut et al. (2005) found evidence for increased performance and increased knowledge as teams spent more time together. This second form of knowledge mechanism functions through either being able to predict the needs of group members in a situation (implicit coordination; Rico et al., 2008), or having awareness of the how group and organizational members will react in a situation (Ren et al., 2006; Weick & Roberts, 1993). Both kinds of relational knowledge reduce task interaction time and errors. Relational knowledge also includes understanding how to “read” and

interpret the other group members during interaction (i.e., interpreting non-verbal behaviors, paralinguistics, politics, network roles, and so forth), resulting in better understanding of each other and, ideally, better performance (Hollinsghead, 1998). Even in groups with negative dynamics, knowledge of how others will react and interact can improve performance (Xia, Yuan, & Gay, 2009).

Proposition 12a: Uncertainty is positively associated with the use of Relational Knowledge.

Proposition 12b: Interdependencies are positively associated with use of Relational Knowledge.

Proposition 13: Relational knowledge is positively associated with the extent of coordination.

Routines as Both Mechanism and Outcome of Coordination

Conceptualizations of routines are well established (see Becker, 2004). Routines are those patterns of action that emerge from interaction and that allow us to act with little to no conscious thought (Becker, 2004). They develop over time and become more deeply ingrained in minds and unconscious practice, to the point that actors not only enact them without much thought but also implicitly believe that other actors also are enacting them (Becker, 2004). Successful routines embed the knowledge and organizational coordinating mechanisms necessary to accomplish tasks across individuals and organizational units.

Investigations have found that routines are more complex than originally thought, on several levels. Routines act as grammars for action rather than as a concrete guide (Pentland & Reuter, 1994). They function as grammars by specifying a broad range of possible actions within a context from which I unconsciously select parts that work together to enact the

routine. In this way the routine enables and constrains action, but by its selection and use in interaction it is further established as routine. Routines also have been found to function at larger organizational levels than just the individual interaction or group interactions. Entire organizations enact routines without conscious member knowledge (Feldman & Pentland, 2003); once established they can promote stability, but also reduce organizational flexibility and innovativeness. Even at the organizational level, routines are (re)established through interaction and formalization into procedures and policies. As small changes occur to routines, they are adjusted and then retained for future enactment (Feldman, 2000). Routines, however, do not always function to improve processes and outcomes; sometimes the routines that are (re)established and reinforced through interaction end up working against some individual, group, or organizational goals, whether intentionally or not. Routines may both embed and reinforce dysfunctional interdependencies and coordination strategies, thus becoming *unusual routines*, leading to short- and long-term group and organizational negative consequences (Rice & Cooper, 2010). Further, unusual routines reinforce the original problem or biases, eventually routinizing those situations and processes. In general, unusual routines can be prevented or resolved by increased feedback, and feedback about the feedback (e.g., double-loop learning; see Rice & Cooper, 2010), involving both organizational mechanisms and knowledge mechanisms. However, CIM and relational knowledge may both be localized within the group generating the unusual routine, thus making it more difficult to identify and resolve the unusual routines. The routine seems locally beneficial, while being dysfunctional for or harming other groups' or the organization's processes and goals, yet without being identified or explained in SCM, SOCM, or resource knowledge.

Contingency/design theorists present routines as facilitating coordinated action by pre-specifying the sequences of tasks and who should perform them, thus reducing the need for workers to interact, and the cost of coordinating work (Tushman & Nadler, 1978). Grote et al. (2008) found that routines function as coordinating mechanisms by reducing the need for interaction (especially interaction about the interactions).

Proposition 14: Routines are established through consistent use of other mechanisms. However, routines function as a coordinating mechanism through the subsequent reduced need for other coordinating mechanisms; thus:

Proposition 15a: Routines are positively associated with decreased group access to stored organizational coordinating mechanisms.

Proposition 15b: Routines function as a coordinating mechanism through the reduced need for interaction in situ.

Proposition 16: More cross-group interaction is positively associated with fewer unusual routines (presuming the unusual routine does not involve the group interaction itself).

Proposition 17: Routines are positively associated with the extent of coordination.

Organizational Outcomes of Coordination

Beyond the three (re)produced outcomes of coordination (organizational mechanisms, knowledge mechanisms, and routines), the general and primary goal of coordination is to accomplish organization outcomes. These actual outcomes may be more or less expected, more or less intentional, and more or less positive. Expected, intentional, and positive goals are often confounded with coordination, with the logical understanding that a higher extent of coordination should result in more successful attainment of organizational goals.

Organizational goals and thus expected outcomes can be either official, which are the understood purposes (from the perspective of the organization), or operative, which more closely represents the actual operating policies of the organization (Perrow, 1961). Operative goals do not necessarily align with official goals and may even run counter to them (a central assumption of agency theory; Eisenhardt, 1989). This is particularly salient when operative goals are examined on the group level or individual level. In these cases there may seem to be a high extent of coordination that manifests as alignment towards attaining an unofficial operative goal, but the net result would be unintended or unwanted outcomes (from the perspective of the organization) (Perrow, 1961). Organizational goal outcomes also can be conceived of in terms of quality or quantity (Argote, 1982; Cheng, 1983, 1984). In his examination of Belgian academic departments, Cheng (1983) found that coordination was positively correlated with increases in both quality and quantity of outputs, but those correlations were moderated by uncertainty differently for the quality than the quantity relationships. As uncertainty increased, the correlation between coordination and quality became more positive, but the correlation between coordination and quantity became less positive. Finally, as discussed above, unusual routines may be an organizational outcome differentially desired, intended, or positive, depending on the organizational location and actors involved.

Proposition 18a: Extent of coordination may be associated with both quality and quantity of expected, intended, or positive organizational output.

Proposition 18b: Extent of coordination may also be associated with both quality and quantity of unexpected, unintended, or negative organizational output.

[INSERT FIG 1]

Figure 1 portrays the broad relationships among interdependencies, uncertainty, coordinating, coordinating mechanisms, coordination, and coordination outcomes, associated with these propositions.

Contributions

I began by identifying four issues in the organizational coordination literature: (1) coordination is typically not explicitly defined, conceptually or operationally; (2) proposed types of coordination overlap or contradict each other; (3) coordination is treated as a secondary aspect rather than as a central concern, and (4) what is arguably a distinctive communicative phenomenon requires more attention by communication researchers. Here I summarize my proposed resolutions of these issues, providing the foundation for the model and propositions.

Coordinating, coordinating mechanisms, and coordination are distinct concepts. The conceptual definitions of coordinating as the overarching process, coordinating mechanisms as the structures that are brought to bear, and coordination as the *in-situ* interaction, allow for a more precise and distinct view of components of organizational coordinating. In clearly distinguishing between coordinating mechanisms and coordination, many of the terms that were identified as coordination have been reframed as coordinating mechanisms (e.g., expertise, tacit knowledge, and implicit coordination).

Distinct coordinating mechanisms represent structurational levels of consciousness. Coordinating mechanisms in the literature were re-framed using structuration levels of consciousness as organizational (discursive level), knowledge (practical level), and routines (unconscious level). The conceptual distinctions between coordinating, coordinating mechanisms, and coordination, and among types of coordinating mechanisms enable a

specific view of how types of coordination and mechanisms proposed by others interrelate, and provide the basis for a more parsimonious model of organizational coordination and communication.

Coordination is a central concern. The third task was to highlight the central role of coordination in organizational structuration. By applying a structurational approach toward coordination as influenced both by coordinating mechanisms and through interaction (re)creating those very mechanisms, I place coordination at the core of the process. The proposed model does so in four ways. First, it highlights the distinct levels of consciousness as mechanisms, allows a reframing of them as possessing distinct aspects of organizational structure, and enables tests of the ways that they might interpenetrate in interaction (coordination). Second, it informs the understanding of structuration via the proposed recursive nature of organizational coordinating. By placing specific mechanisms as the structure (coordinating mechanisms), and offering a conceptual context in which to examine the ways in which practice (re)creates those structures, it encourages further investigation of structuration. Third, it proposes rules and resources as being closely aligned with the distinct levels of consciousness. Fourth, it proposes how coordinating, coordinating mechanisms, coordination, and outcomes are interrelated.

Coordination is a communicative phenomenon. I theorize coordination as a fundamentally communicative phenomenon. Without communication, no shared meaning could emerge and no coordinating mechanisms could be created or applied. At the micro level, activity coordination, the third communication flow identified by McPhee and Zaug (2000), underscores the interactive nature of coordination. Activity coordination specifically identifies the interactive nature of organizational members as they adjust to germane acts of

others and to the constraints of the situation. At the macro level, a structuration lens underscores the whole of organizational coordination as communicative. As proposed in McPhee and Zaug's (2008) fourth communication flow, institutional positioning, organizations are positioned within a larger context and the relationships between the organization and its context are managed through communication. This framing within a larger context occurs with coordination, but it is nested within the organization, so that coordination occurs as part of the negotiation of positioning. The final point at which organizational coordination is better elucidated by utilizing an organizational communication lens is at the connection of structure and practice. Much previous work has focused on structures, process, or outcomes. However, by utilizing the concept of the duality of structure I note not only specific aspects of organizational coordination—structures, coordination, or outputs—but also see the ways they interconnect through communication. Coordinating mechanisms (structures) are brought to bear on coordination (practice/process) through communication, and through communicative interaction those very structures can be (re)created.

Research Questions and Hypotheses

Although there is an abundance of literature on organizational coordination, as evidenced above, there is still much work to do. The obvious first task is to test the proposed model in an active organizational environment to check its veracity;, and the second step is to begin to examine the specific relationships. This requires a mixed methods approach that includes two phases. Phase One is a confirmatory qualitative component and Phase Two involves the creation, administration, and assessment of a survey instrument. This investigation seeks answers to the following research questions:

RQ1: How do the lived experiences of organizational members of a complex organization align with the proposed theoretical model?

RQ2: How do the lived experiences of organizational members of a complex organization differ from the proposed theoretical model?

As part of the mixed method approach employed in this study, an objective of Phase One data analysis is to guide Phase Two. Thus, a third research question is posed:

RQ3: How does the model need to be adjusted to accommodate the findings of Phase One?

Through Phase One analysis several additional areas of interest emerged. These will be more fully explored below, but for clarity, those are:

RQ4: In what ways do relationships affect coordinating?

RQ5: How does satisfaction affect coordinating?

RQ6: Is there a difference in perceived status difference between Librarian and Non-Librarians and if so how does it affect coordination?

This research looks specifically at the mechanisms themselves and the ways that they interact in affecting coordination. For this reason, several of the propositions are not tested in Phase Two. These include examination of organizational output (prop. 18a and 18b) and mechanisms as reproduced or adjusted through coordination (8a, 8b,8c). Additionally, to limit the size of the survey several other more complicated propositions will need to be examined in future research, including propositions 2, 11, 15a, 15b, and 16. Though these propositions are not tested in this study they are still presented as hypotheses below to a) keep continuity between the model proposition and the hypotheses and b) to make future directions for research clear. Those hypotheses that are not quantitatively investigated here

are marked with an * throughout. An important note however is that though these hypotheses were not investigated in Phase Two they are occasionally included in the results and discussion of this study as they emerge from Phase One data and as they speak specifically to the arguments made in the presentation of the model above.

Hypothesis 1a: Uncertainty is positively associated with use of structural coordinating mechanisms (SCM).

Hypothesis 1b: Interdependencies are positively associated with the use of SCM.

*Hypothesis 2: SCM are enacted through communication.

Hypothesis 3: SCM are positively associated with the extent of coordination.

Hypothesis 4a: Uncertainty is positively associated with use of conscious interaction mechanisms (CIM).

Hypothesis 4b: Interdependencies are positively associated with the use of CIM.

Hypothesis 5: CIM are positively associated with the extent of coordination.

Hypothesis 6a: Uncertainty is positively associated with use of stored organizational coordinating mechanisms (SOCM).

Hypothesis 6b: Interdependencies are positively associated with the use of SOCM.

Hypothesis 7: SOCM are positively associated with the extent of coordination.

*Hypothesis 8a: Extent of coordination may reproduce or reshape structural coordinating mechanisms.

*Hypothesis 8b: Extent of coordination may reproduce or reshape conscious interaction mechanisms.

*Hypothesis 8c: Extent of coordination may reproduce or reshape stored organizational coordinating mechanisms.

Hypothesis 9a: Uncertainty is positively associated with the use of Resource Knowledge.

Hypothesis 9b: Interdependencies are positively associated with the use of Resource Knowledge.

Hypothesis 10: Resource knowledge is positively associated with the extent of coordination.

*Hypothesis 11: Stored organizational coordinating mechanisms interact with resource knowledge such that higher levels of both lead to even higher extent of coordination.

Hypothesis 12a: Uncertainty is positively associated with the use of Relational Knowledge.

Hypothesis 12b: Interdependencies are positively associated with the use of Relational Knowledge.

Hypothesis 13: Relational knowledge is positively associated with the extent of coordination.

*Hypothesis 14: Routines are established through consistent use of other mechanisms.

*Hypothesis 15a: Routines are positively associated with decreased group access to stored organizational coordinating mechanisms.

*Hypothesis 15b: Routines function as a coordinating mechanism through the reduced need for interaction in situ.

Hypothesis 16: More cross-group interaction is positively associated with fewer unusual routines (presuming the unusual routine does not involve the group interaction itself).

Hypothesis 17: Routines are positively associated with the extent of coordination.

*Hypothesis 18a: Extent of coordination may be associated with both quality and quantity of expected, intended, or positive organizational output.

*Hypothesis 18b: Extent of coordination may also be associated with both quality and quantity of unexpected, unintended, or negative organizational output.

Both Phase One and Phase Two will be more fully explained in Chapter 3 and Chapter 4.

Chapter Three

Methods

The proposed model draws on multiple disciplines as well as attempts to bring divergent conceptions under one theoretical umbrella. In doing so it was conceivable that some aspects of the model may manifest differently than proposed. Thus, the proposed model required initial exploration to see if it aligned with the lived experiences of members of a complex organization. It was only then that the model could be revised and specific relationships measured.

Creswell and Clark (2007) argue that one of the four reasons for using mixed methods research is when the problem requires primary qualitative exploration and then further quantitative analysis. Following this argument, the current research used a mixed method approach, including in Phase One, qualitative data gathering and analysis through observation and interviews, and in Phase Two, a subsequent quantitative survey creation, data gathering, and analysis. Using mixed methods allows for an initial exploratory phase to be paired with more quantitative methods resulting in more robust findings. This study used interview data gathered principally based on a method outlined by Halcomb and Davidson (2006) – although this data was augmented by other data as noted below, couched within thematic analysis as presented by Braun and Clarke (2006), in order to determine the theoretical fit of lived experiences as compared with the proposed theoretical model.

This initial work was to be followed by survey methodology using questionnaires, statistically evaluated first with confirmatory factor analysis and then structural equation modeling, to measure proposed constructs and specific proposed relationships. The low number of respondents proved this last step difficult; thus although these tests were run, the results were not robust enough to draw strong conclusions. Due to this limitation,

quantitative assessment was adjusted to first assess the quality of the scales and then use regression to examine the relationships of the variables where possible. These issues will be more fully explored below.

The following sections include the traditional components: study site, participants, measures, procedures, and data analysis. However, due to the multi-method approach there are some additional complexities. I first offer a brief overview of the study site in general and then each section thereafter separates the discussion of first Phase One (qualitative analysis) and then Phase Two (quantitative analysis). Additionally, in several sections there is discussion of how Phase One findings affected the methodology of Phase Two.

Study Site

The study site was the library of a large Western U.S. public university that was undergoing a substantial construction project. During this construction project, whole sections of the library were being closed, moved, and otherwise disrupted. Entire departments were being moved to other buildings for a time; some were moving to different locations within the building; and even those that remained where they were having their work disrupted by noise, construction workers, and changes in organizational structure. Some departments and positions were done away with entirely and integrated into other aspects of the library. It is assumed that attempts to coordinate (align work) will be more salient during times of turbulence, allowing for a clearer picture of the coordinative process in the minds of participants.

The structure of the library was a standard hierarchical system with some departments and units working more closely than others. At the head is the University Librarian (UL), with nine direct reports including the heads of 8 divisions and the executive assistant to the

UL. These division heads hold varied titles including Associate or Assistant University Librarian (AUL), Director, and Department Head. Under these divisions are departments, most run by a Department Head (there were several vacancies and several people in acting roles), and under each of these departments were individuals with no direct reports as well as "units" with Unit Heads that had oversight of at least one other person. The divisions include: Research and Scholar Services, Collection Services, Outreach and Collaboration, Information Technology, Development, Tech Support Services, and the Thoreau Writings (see Appendix 1 for organizational charts).

Participants include members of the library staff from almost every level: executive management, middle management, supervisors, and line staff. Student workers were not included in this study on request of library management, although their work was observed. Management did, however, approve contact with all other employees during work hours. The study was completed over the course of 3 years (2013-2016). Interviews were conducted through the Fall, Winter, and Spring of the 2014/2015 school year and surveys were mostly collected Winter and Spring of the 2015/2016 school year. Total possible participants numbered approximately 140 (with some fluctuation during the course of the study due to natural attrition and replacement of employees).

Participants Phase One (Qualitative)

Participants for the first phase were selected in order to secure the broadest representation possible with organizational members from distinct job roles, divisions, as well as different levels of control. A chart was created to enable visualization of desired representation (see table 2). Though, representation was not quite as widespread as desired, almost all divisions were represented by at least one voice as can be seen in the table. The

process included first attempting to get as many of the staff to volunteer as possible. These initial attempts included the researcher attending several all-staff meetings summarizing the project and asking for participants and contacting all members of the library staff via e-mail to request participation. The actual interview respondents were then compared to the chart of desired representation. Where underrepresentation was apparent, additional attempts were made to elicit participation specifically from those units and divisions, including follow-up e-mails, calls to office phones, and personal visits. There were still a number of people that were not interested in participating, including several divisions that were particularly reluctant as a group. This will be discussed in more detail in later sections. In total, I reached out at least once by email to 129 of the library staff (of 137 at the time of staff identification). Among those, 46 accepted the invitation to be interviewed (35.7%). It should be noted thought that once thematic saturation was complete, continued attempts at gaining interviewees were halted.

Except for information on department, hierarchical level, and whether a participant was a librarian or not, descriptive statistics were not gathered from Phase One participants as part of the interview. Drawing from their quantitative responses I was able to establish age, gender, and race. The age range closely matched that of survey respondents in Phase Two (noted below), with an average age just slightly younger (M=43.52). As with the larger sample there were more women (N=32) than men (N=14). The respondents were mostly white (N=30), with others racially identified as black (N=4), Asian (N=7), and Hispanic (N=3), and 2 declining to state.

INSERT TABLE 2

Participants Phase Two (Quantitative)

To attain valid results from the quantitative portion of the research, a high participation rate was required. An attempt was made to include all members of the library staff (again excluding student workers). For Phase Two the researcher attended several departmental meetings with hard copies of the survey, emailed all library staff with a link to a digital version of the survey, and finally stopped by specific participants' desks to request participation. Phase Two participants were also offered a $5.00 Amazon gift card for their participation as well as a chance to win one of two $50.00 Amazon gift cards. Total initial participants for Phase Two included 102 people, though as noted below 17 were removed from the data pool for a variety of reasons. This resulted in a final sample of 85 respondents (approximately 60% response rate) for analysis.

Descriptive statistics for Phase Two participants (i.e., the 85 who both completed a survey and were retained for analysis) are as follows. Just over 56% were non-librarians (M=48) as opposed to librarians (M=37) and ranged in age from 24-71 (M=46.36). The racial diversity included mostly whites (N=59), although there were some people of Hispanic (N=6), black (N=4), Asian (N=7) descent, as well as several that identified themselves as "other" or left this blank (N=9). There were 56 females, 25 males, and 4 that did not identify as either. Almost all had at least at least some college education, with 31 completing a graduate degree, 47 a bachelor's degree, and 4 with some college coursework. The remaining 3 left this item blank. The researcher did gather data on which departments contributed, but offering that information would put the confidentiality of the participants at risk, so it is not included here. There is some reference to department in the qualitative section when confidentiality and anonymity could be maintained.

The library management sent out a memorandum alerting staff of the possibility of being contacted for this research and letting them know that they may take time during work hours to be involved. Regardless of how the participants were contacted or for which phase, all were informed that their participation would be kept in the strictest confidence, that their participation was voluntary, and that they could remove themselves from participation at any time in accordance with the IRB consent guidelines.

Procedures - Phase One

As noted, this study began using an interview and transcription methodology described by Holcomb and Davidson (2006) and located within a broader thematic analysis perspective. In large part this decision was based on two things. The first was limited resources in terms of time to transcribe and money to have it transcribed. The second was a recognition from past experience that led the researcher to question the value of verbatim transcription. Initial plans for research followed Holcomb and Davidson's claim that verbatim transcriptions should be avoided as they are consistently error ridden (e.g., Easton, McComish, & Greenberg, 2000; Poland, 1995), and the theoretical benefits of transcribing every word as measured against the costs of attaining them have been called into question (Markle, West, & Rich, 2011). Halcomb and Davidson (2006) suggest a method that offers a way to gather interview data thoroughly, while avoiding some of the issues of concentrating on verbatim transcription errors and resource usage. Though the method presented by Halcomb and Davidson was found to be very thorough and useful in many regards, the lack of verbatim transcriptions proved troublesome. The issues surrounded two key concerns. This first concern was the challenges a lack of verbatim transcription offered to making clear connections between participants and the second was in giving accurate voice to the

participants in writing up the results. To accommodate this I integrated verbatim transcription into the methodology.

Thematic analysis enables a researcher to identify, analyze, and report patterns within data (Braun & Clarke, 2006). A rather flexible approach, it allows for not only examining completely emergent themes as in grounded theory, but also to for use in theoretically guided investigations. The goals of this study required both; the researcher was looking for confirmation or disconfirmation of the theoretical model, and looking for emergent themes that might have been missed in the current model's development -- and therefore useful in revising the initial model. Matching Holcomb and Davidson's (2006) data gathering technique with an overarching thematic analysis perspective (Braun & Clarke, 2006) generated the following initial steps for Phase One of this research.

1. ***Audiotaping of the interview and concurrent note taking***. Each interviewee was informed of the risks and of the fact that the interview was to be recorded. An informed consent form was signed before the interviews commenced. The protocol for these interviews was semi-structured, having been derived from the model, allowing for the probing of *a priori* as well as emergent concepts of interest (see attached Appendix 2 for an example interview protocol). Interviews were typically conducted at each participant's place of work, though many were conducted at a café near the library when deemed more accessible and convenient for the participants. During the interviews the researcher recorded the interview and took brief written notes that included observations of nonverbal nuances, environmental concerns, and times and notes regarding pertinent themes as they emerged. (For several of the interviews, notes were taken on a laptop during the interview). These notes were

summary in nature rather than detailed, to allow for attention to the interview itself and to the interviewee. These interviews lasted anywhere from 30 minutes to 1 hour, with most of them being closer to 45 minutes. All audio files were imported into Nvivo v11 software. Additional sources of data were integrated into this process, including recordings and notes of a variety of executive level and departmental meetings (all attendees had signed informed consent); observation of several all staff meetings that were conducted in a large lecture hall (all those that addressed the audience had signed informed consent); and incidental observation of several interactions, including front desk staff at work and the interactions of interviewees with the staff around them. I was also permitted to observe and take notes at several "off-site" strategic planning meetings that included key stakeholders from throughout the library. These sessions were facilitated by an internal HR person. Notes were taken and included in the analysis noted below.

2. ***Reflective journaling immediately post interview*.** As soon after the interview as possible (typically the same day), the researcher reflected on the interaction and reviewed the notes, expanding on and correcting them where needed. This reflection not only included aspects of the interaction, but began to explore major ideas, themes and issues raised by the participants for specific attention during Step 3 and data analysis. At this point both the reflection and the field notes were typed, if they were not already.
3. ***Listening to the audiotape and amending field notes and observations and transcription*.** Once the interviews were complete, and after the field notes were adjusted and the reflection was completed, the researcher returned to the interview

recording and did several things. As noted above, Holcomb and Davidson do not call for a detailed transcription. This researcher, however, found that the lack of detailed quotes and complete flow of conversation did not allow a thorough comparison of themes, so all interviews were transcribed by a professional transcriptionist and the transcriptions imported into Nvivo. Additionally, during this step the researcher used the audio recording in conjunction with reviewing field and reflection notes to make sure that the notes were a veridical representation of the interaction. The researcher listened to the audio recordings several times, making notes as needed, until they seemed to provide an accurate representation of the interaction specific to the study. Special attention was given to those points in the field notes that were designated by a time stamp and noted theme or concern. These additional notes were marked differently (using track changes) to distinguish them from the notes taken during the interaction and immediately after. These notes then were also uploaded into Nvivo and matched to the transcriptions and audio recordings.

4. ***Preliminary thematic analysis.*** In this step the researcher used Nvivo, a qualitative analysis software, to begin to more fully explore the data. At this point, thematic coding began. Data was marked as of interest for analysis by indicating either confirmation with the proposed model or questioning aspects of it (this will be more fully explored in the Results section below). Quotes from the recordings were notated at this stage as evidence of specific themes or of particular interest.
5. ***Secondary thematic analysis.*** After steps 1-4 were completed, a research assistant reviewed the work. The research assistant examined the audio recording along with the field notes, looking for any discrepancies in the data or in the data analysis,

including missed data, mislabeled data, or disagreements of indicated themes. This facilitated validation of data coding and theme development. In general, the research assistant validated the primary researcher's interpretations, but on several occasions the assistant brought to light important considerations. For example, there were several comments that should have been coded as both stored organizational mechanisms and resource knowledge, but the primary researcher had missed the stored organizational mechanism in the comments. Additionally, it was in conversation with the research assistant about several of the early interviews that the need for adapting the protocol to more clearly probe for routines emerged.

6. ***Adjustment to interview protocol and to the coding as indicated by analysis.*** As data was analyzed and themes identified from the early interviews, the researcher made changes to the interview protocol as needed for subsequent sessions. Examples of needed changes included the following. Within the first interviews an area of concern with the quality of supervision emerged, so subsequent interviewees were asked specifically about that issue rather than having to add probes within the interview. Additionally, it was discovered that the variety of stored organizational coordination mechanisms was specific to the type of department in which most interviewees worked, so department-specific adjustments were. Finally, it appeared that the questions about routines were not eliciting a detailed response and instead required interviewer probing, so those questions were adjusted slightly to make them more explicit (for example asking specifically if routines were interrupted)
7. ***Final thematic review.*** The foregoing six steps were continued with each interview or set of interviews leading to a refinement of the themes and small adjustments to the

protocol until no further themes or changes emerged. At this point the researcher gathered the final adjusted themes and did a final review of the data. The goal was to search for further support or contradictions, noting any unresolved discrepancies for the final write up. As with steps 1-6 above, Nvivo was used to further examine and verify themes in the data.

This derivation of final themes enabled both confirming and disconfirming interpretations of the model. Emergent themes also were used to fine-tune the proposed model and the relationships inherent in it, as discussed in the qualitative results section below.

Additional sources of data were integrated into this process, including recordings and notes of a variety of executive level and departmental meetings (all attendees had signed informed consent); observation of several all-staff meetings that were conducted in a large lecture hall (all those that addressed the audience had signed informed consent); and incidental observation of several interactions, including front desk staff at work and the interactions of interviewees with the staff around them. I also was permitted to observe and to take notes at several "off-site" strategic planning meetings that included key stakeholders from throughout the library. Each of these sessions was facilitated by an internal HR person and included 8 groups of 6 members each that were walked through identifying organizational values and coming up with a mission statement. The sessions ran 3 hours each and occurred over the course of two days in another university building. Only some participants in these sessions were willing to sign Informed Consent forms. For this reason, the sessions were not recorded and only quotes from those who signed consent forms are used. Data from all of the above was uploaded to Nvivo and included in analyses. Phase One

data was then utilized to finalize the survey instrument, as examined in Phase Two noted next.

Measures and Procedures - Phase Two

Survey purpose. The second phase employed a self-report questionnaire intended to test relationships of importance in the refined model and propositions that emerged from Phase One. This second phase was intended to accomplish two tasks. The first objective was to allow for a quantitative validation of the measures by using factor analysis to determine if the scale items indicate the proposed constructs. The second objective was to allow for a more precise investigation into the relationships proposed, offering not just evidence for or against the presence of those relationships, but also analyzing the interrelationships, strength, and statistical significance of those connections.

Measures. Drawing from questionnaires created by Ballard and Seibold (2004), Faraj and Sproul (2000), Gittell (2001, 2002) and others, an initial questionnaire was developed that examines how the proposed coordinating mechanisms impact alignment of work, and how uncertainty and interdependencies impact those relationships. A particular challenge in developing this instrument emerged from the Phase One research. The target population was highly varied on many levels. In terms of departments, the work they did ranged widely, including customer service (front desk), IT, facilities, administration, book binding, accounting, HR, development, and others. Additionally, the target population included varied organizational levels (from line staff all the way up to executive), experience levels, and tenure at this institution. This variance offered challenges for the creation of an instrument that accommodated everyone taking it. While some scales easily adapted to a variety of departments (e.g., SCM), others were more challenging. For example, for SOCM, many

departments have different names for where they store data. To accommodate this, questions were posed in as broad a context as possible while still being specific enough to solicit the information required for analysis. (See Appendix 3 for information on scale sources with estimates of reliability and validity where available).

Coordination. At the core of this model and thus of this phase of the research is the measurement of coordination, which as noted in the literature review is particularly troublesome. As noted above, the operationalizations that best measure coordination as it is conceived here include variables that measure *in situ* interaction, and the alignment of work. *In situ* interaction includes variables such as information that is exchanged in a timely manner, differences negotiated quickly, lack of disagreement, helping, and problem solving capabilities (Faraj & Sproul, 2000; Gittell, 2002; Zackrison, Seibold, & Rice, 2015). Alignment of work includes coherence of work, lack of duplication of work, everyone in the group doing the tasks they were supposed to do, people able to do their jobs without getting in each other's way, no delays in the process, subtasks closely harmonized, and goals understood by the members (Cheng, 1983, 1984; Gittell, 2001, 2002; Hoegl et al., 2004; Kraut et al., 2005). This measure was addressed in questions that look at both intradepartmental as well as interdepartmental work. The intradepartmental coordination scale includes the following items:

1. *People in my department share their special knowledge and expertise with one another.**
2. *If someone in our department has some special knowledge about how to perform the team task, he or she is not likely to tell the other member about it.**

3. *There is virtually no exchange of information, knowledge, or sharing of skills among members.**
4. *More knowledgeable team members freely provide members with hard-to-find knowledge or specialized skills.**
5. *Discussions and controversies within my department are conducted constructively.**
6. *Suggestions and contributions within my department are respected.**
7. *Suggestions and contributions within my department are discussed and further developed.**
8. *There is a cooperative work atmosphere in our department.**
9. *All team members are equally engaged to achieve the common goals.**
10. *All department members are fully contributing to our department.**

The interdepartmental coordination scale includes these items:

1. *Connected processes and activities were well coordinated with other departments.**
2. *Duplicated and overlapping activities were avoided in interdepartmental work.**
3. *We had no problems in coordinating with other departments.**
4. *Conflicts with other departments were settled quickly.**
5. *Discussions with other departments were conducted constructively.**
6. *All department members are committed to the same goals.**

Organizational Coordination Mechanisms.

*Structural Coordination Mechanisms***.** To measure structural coordination mechanisms, participants must be asked to think about the aspects of the organization that are established to facilitate coordination. These include aspects of rules, roles and power

structures including the hierarchical structure and departmentalization. Questions here include:

1. *There are clear indications as to who should do what in my department.**
2. *The assignment of duties within my department is clear and easily discernable.**
3. *I don't know who is supposed to report to who within the organization.**
4. *I have been made aware of specific policies that help me do my job.**
5. *What I am allowed to do as part of my job has been made clear to me.**
6. *What I not allowed to do as part of my job has been made clear to me.**

Note: Additional measures in this scale include 1a and 1b from Conscious Interaction Mechanisms below.

*Conscious Interaction Mechanisms***.** These mechanisms are measured by examining the direct interaction of the participants with management of the organization and may include meetings (team, departmental, or organizational), or individual interactions -- either face to face or mediated by technology. The 11 items for this scale were largely drawn from Faraj and Sproul (2000), and from Van de Ven, et al. (1976):

1. *Identify the extent to which the organization uses the following to guide your work*
    a. *Formal policies and procedures. (SCM)**
    b. *Project milestones and delivery schedules. (SCM)**
    c. *Project documents and memos. (SOCM)**
    d. *Regularly scheduled team meetings.**
    e. *Work/project review meetings.**
    f. *Work inspections.**

2. *Indicate the extent to which each of the following mechanisms were used to coordinate the work among department personnel.*
    a. *Through the department supervisor as a coordinator of work within the department.**
    b. *Through informal communication channels (simply contacting another member who is likely to have the desired information.**
    c. *Through a standing committee that meets regularly to plan and coordinate the work.**
    d. *Through staff meetings that are held to coordinate the work.**
    e. *Through a group brought together for problem solving on particular issues relating to the work.**

*Stored Organizational Mechanisms***.** These are perhaps the most easily recognized mechanisms for participants, though as noted they are only as useful as a) the knowledge that they exist, and b) the utilization of them. Five items based on items developed by Yuan et al. (2007) were used:

1. *For problems that arise, there are written rules and procedures for dealing with them.**
2. *How often do you think you and other members of your team retrieved information from the stored policies and procedures that are written down during the past week?*
3. *I regularly access stored information that helps me do my job.**
4. *I only access stored information when I am faced with a new challenge.**
5. *There are detailed instructions for many of my tasks stored for me to access as needed.**

Knowledge Mechanisms.

*Resource Knowledge***.** This measure attempts to determine the extent to which the participant is aware of resources in their environment and includes items identified by Faraj and Sproul's (2000) work on expertise coordination:

1. *My department members have a good 'map' of each others' talents and skills.**
2. *Department members are assigned to tasks commensurate with their task-relevant knowledge and skill.**
3. *Department members know what task-related skills and knowledge they each possess.**
4. *Department members know who on the team has specialized skills and knowledge that is relevant to their work.**
5. *Some department members lack certain specialized knowledge that is necessary to do their task.**
6. *Some people in our department do not have enough knowledge to do their part of the team task.**

Relational Knowledge. The measurement of knowing how group members are going to react and what you can expect from group members is based on work by Ren et al. (2006), Rico et al. (2008), and Hollingshead (1998) among others.

1. *I know how the members of my department react in stressful situations.*
2. *I have a positive relationship with most of my co-workers.**
3. *When I need help I know who in my department will be willing to help.**
4. *There are people in my department who are unwilling to help when needed.**

Routines. As unconscious mechanisms, these can be difficult to measure with self-report data. However, by asking about the amount of work that requires no conscious interaction and by examining those times where uncertainty disrupts routines, this mechanism can begin to emerge.

1. *The percentage of my job that I am able to do without really thinking clearly.*
2. *I complete tasks without having to stop to figure out how to do it.**
3. *My job takes consistent attention to complete.**
4. *When I am not paying attention to my work it is easy to make mistakes.*

Outcomes. Quality of outputs, quantity or outputs and Mechanism as outcomes will not be the focus of this research.

Mediating or moderating variables.

Uncertainty. As noted above, uncertainty is not only a common variable in coordination research, but is vital understanding the variation of use of the differing mechanisms. For this particular project, the fact that many of the departments were moved or changed (thereby creating disruptions in the management of the library) should increase uncertainty more for some departments than others. This was measured using eight items drawn from Van deVen, et al. (1976):

1. *To what extent is there a clearly defined body of knowledge or subject matter which can guide you in doing your work?*
2. *During the course of your work, how often do you come across specific but difficult problems that you don't know how to solve, and you have to take some time to think through by yourself or with others before you can take any action?**

3. *In general, how much actual "thinking" time do you usually spend trying to solve such specific problems?**
4. *In some jobs, things are fairly predictable. In others, you are often not sure what the outcome will be. What percent of the time would you say that you are generally sure what the results of your efforts will be?*
5. *In terms of the major tasks you are assigned, on the average how long is it before you know whether your work effort is successful?*
6. *How much variety in cases, claims, clients, or things do you generally encounter in your normal workday?*
7. *Regardless of the variety of cases, claims, or clients, to what extent are the activities or methods you follow in your work about the same for dealing with classes of categories of cases, claims, or clients.*
8. *To what extent do people in this unit do about the same job in the same way most of the time?*

And a ninth question, which looked specifically at impact of the construction project on uncertainty of work, was added.

9. *To what extent has the library construction project impacted your knowing how to do your job (e.g., things that you could complete before without having to think about that you now have to think about before completing?)*

Interdependencies. Often regarded as the central component of what is being coordinated, interdependencies can be examined as within group/team/department as well as on more macro organizational scale. The items for this scale were modified from those developed by Ballard and Seibold (2004) and Cheng (1983).

1. *My work is relatively independent from others.**
2. *My basic work processes are highly dependent on others within my work group.**
3. *My work relies on others completing their tasks before I can complete mine.**
4. *Others in my department rely on my work to complete their own.**
5. *Others in the library rely on my work to complete their own.**
6. *I must adjust or adapt what I am doing based on the performance of others.**
7. *I often need to communicate with others to complete my work.**

These questions were then reframed to look at interdepartmental coordination as well, and are as follows:

1. *My department's work is relatively independent from other departments.**
2. *My department's basic work processes are highly dependent on other departments.**
3. *My department relies on other departments completing their tasks before it can complete departmental work.**
4. *Other departments rely on my department to complete work before they can complete their own.**
5. *My department must adjust or adapt what it is doing based on the performance of other departments.**
6. *My department often needs to communicate with other departments to complete work.**

Additional variables. As will be much more fully discussed below, there were several issues that emerged from the qualitative data that led me to adjust the survey somewhat before administering it. Of primary concern was the consistent mention of relationship and satisfaction with leadership as a component to coordination. Different from relational

knowledge concerns, these included issues surrounding interpersonal relationships with supervisors, with co-workers, and between supervisors and upper management. An additional theme that emerged was the relationship between employees who were designated as librarians and those who were not. There were several persons among both librarians and non-librarian staff that made comments surrounding status. To investigate these additional concepts, several questions were added. Three items addressing status included:

1. *I think that librarians have a higher status level than non-librarian library staff.*
2. *I feel that other librarians feel they have a higher status than non-librarian staff.*
3. *I feel the non-librarian library staff feel that librarians have a higher status than non-librarian library staff*

Five items were added to address the concern for relationship and satisfaction:

1. *I would recommend working for the UCSB Library.**
2. *I would recommend working for my supervisor.**
3. *I have a positive relationship with my supervisor.**
4. *My supervisor supports the University Librarian's decisions.**
5. *My supervisor has a positive relationship with departmental employees.**

After analysis, it was determined that these were better represented as two scales. One that examines the individual's perspective on the workplace, which I will call Personal Organizational Perspective. This first is made up of the first three questions. The second, called Supervisor Organizational Perspective seeks to measure how positive the supervisor's perspective is and includes the last two questions.

Procedures. The instrument was administered in several ways. The first option was through the emailed delivery of a link to the instrument as hosted on the Survey Monkey website (N=62). To assure confidentiality each participant was emailed individually with the link to the instrument. On the opening page of the survey was the informed consent letter and a note indicating that entering their individual code and beginning the survey constituted their informed consent. Additional surveys were collected during departmental meetings or individually from library staff in person (N=40). After the researcher asked permission of the department heads, several responded by allowing the researcher the first 20 minutes of their meetings to administer the survey. It was particularly challenging getting engagement on the surveys and several attempts had to be made to get participation, with a number of library staff specifically stating that they would not be participating. The potential reasons for this reticence are explored in the Discussion section. Once all attempts to collect surveys had been exhausted, a total of 102 surveys were initially entered into SPSS for analysis.

Data analysis. The initial proposed plan is outlined here and the ways it was adjusted is discussed in more detail thereafter. Initially it was assumed that once data was collected, items would be checked for validity, all scales would be analyzed using confirmatory factor analysis (CFA) to ascertain the goodness of fit of the measures to the proposed constructs, and then Structural Equation Modeling (SEM) would be used to test the fit of the proposed model. Hoyle (2011) identifies SEM as more appropriate than more restrictive statistical procedures for testing the fit of complex models due to its ability to take the whole model intro consideration in evaluation. Seaman and Weber (2015) offer significant advice for the proper use of SEM and their guidelines were to be used for this analysis. These include providing a description of the initial model as well as model revisions, a discussion of how

the methodological design can discount alternative models, chi-square statistics as well as at least one other absolute fit index, how many free parameters are being estimated, and the ratio of sample size to free parameters with a minimum of 10 cases per parameter and an ideal of 20 (p. 50). Due to the limited number of responses, I was nowhere near 10, much less 20, and so changes were made to the plan. This also created problems for using CFA.

Below I first discuss the examination of individual items, then how scales were validated, and ultimately how the model was tested. Before any other tests were completed the data was cleaned by first visually examining the data, and then using SPSS to create a frequency table and run descriptive statistics for each item including histograms. Initial visual examination of the data exposed a number of people that had left significant portions of the survey blank, as well as one person who obviously entered right down the center on every single item. This resulted in dropping ten surveys from the final analysis. The frequency table identified an additional seven individuals who had completed both a hand survey and an online survey. After checking to make sure the two responses were generally the same I eliminated the duplicates. These procedures resulted in a final count of 85 survey respondents for final analysis.

Item validation. In order to conduct factor analysis of any type it is important to assess whether the data are suitable for analysis. This includes examining the data for missing data and making accommodations for that, examining the items visually for errors, and checking the distribution normalcy of the items. Using descriptive statistics and histograms, each item was examined for potential issues. Among items under consideration, there were eight with one missing response each, and one with two missing responses. For these nine items the missing variable was replaced with the mean for that item for further

analysis. Additionally, the item “How often in the past week did you access info…” was missing 5 responses This, in addition to the histogram showing significant skew as well as several significant outliers, resulted in the removal of this item from further analysis. All but two items showed visually normal data; the two were close enough that they were left in analysis at this point.

According to Curran, West, and Finch (1996), a univariate skewness and kurtosis nearing plus or minus 2.0 can cause significant problems with further data analysis. To assess the normalcy of this data set, the items were analyzed for skewness and kurtosis using SPSS. Only a few items were even outside the +- 1.0 range including:

What percentage of your time are you sure of the results of your work (S=-1.3, K=.94)

Extent of variety in a normal workday (S=.81, K=1.46)

How much has the construction project impacted work (S=.18, K=-1.17)

My job takes consistent attention to complete (S=1.21, K=1.26)

People in my department share their special knowledge and expertise (S=-1.14, K=1.23)

Of more concern were the following items, as they each come from the same scale. This will be examined more in the following section on scale validation.

I have positive relationships with most of my coworkers (S=-1.34, K=2.29)

I know how members of in my department react in stressful situations (S=-.69, K=2.05)

When I need help I know who in my department will be willing to help (S=-97, K=2.05)

Scale validation. As noted above, due to the low number of data points, using true Confirmatory Factor Analysis was not an option. Instead SPSS was utilized to run principal components analysis based on the theoretical assumptions of the model and in order to identify if all the respective items loaded together or not on their respective component.. For each of the scales below this method is used to refine the scale by identifying and removing those items that do not load at least at .60 (Field, 2005). In each case the scale is then retested with the final items and then inter-item reliability based on Cronbach's Alpha is then identified. Items that loaded higher than .60 and were included in final version of each scale are designated with a * in the measures section (See Table 3 for details). Several of the scales proved to have very strong reliabilities, including both measures of coordination, Personal Organizational Perspective, and Resource Knowledge (Cronbach's Alphas ranging from .83 to .95). Several others were of questionable strength even after adjustments to the scales, such as SOCM, Relational Knowledge, Routines, and Uncertainty (respectively, $\alpha = .60$, $\alpha = .61$, $\alpha = .65$, and $\alpha = .64$). All other scales ranged from .74 to .80. I then created scale items in SPSS by recoding into new scale variables based on the mean of the component variables for each.

INSERT TABLE 3

Methods of testing the model. Recognizing that there just were not enough data points to allow for the analysis desired, the first decision was to only examine the mechanisms and their predictive ability towards coordination. Even with that limitation, SEM was not a viable option. However, in the spirit of the original proposed methodology I still utilized AMOS to attempt to run an SEM model. First I attempted to reduce the number of variables by combining sub-items into larger items. So, Organizational Mechanisms

(SCM, CIM, & SOCM) became one latent variable, and Resource Knowledge and Relational Knowledge were combined into Knowledge Mechanisms and Routines was left as an individual variable. This still left the model with a significant Chi Square (an undesirable result in SEM) and RMSEA of .334 when less than a .08 is desirable.

I then turned to SPSS and bivariate correlation analysis to test the individual relationships as well as possible, knowing that more work would need to be done in the future. I first ran correlation analyses on each of the mechanisms with uncertainty, interdependencies (both intra and inter-departmental), and with Coordination (both intra and inter-departmental) looking to test the relationships proposed in the Hypotheses (see Table 4 for details). Uncertainty had a slight significant positive relationship with SCM and Resource Knowledge, but did not have a significant relationship with CIM, SOCM, or Relational Knowledge. Interdependencies as noted were divided into intradepartmental and interdepartmental and had complex results. Intradepartmental interdependencies were associated with only SCM. Interdepartmental interdependencies were not associated with SCM, or either knowledge mechanisms. However, there was slight somewhat significant negative relationship between interdepartmental interdependencies and both SOCM and CIM. Coordination was also divided into intra- and interdepartmental and also offered some complexity in the results. SCM had a slight, but highly significant relationship with both. CIM and SOCM had highly significant substantial relationships with both. Knowledge Mechanisms both had highly significant relationships with both intra- and interdepartmental Coordination, but they seemed to impact them differently. Resource had a much higher impact on intradepartmental than it did on interdepartmental. Relational Knowledge reversed

that with a much higher impact on interdepartmental the intradepartmental. Routines however had no significant impact on either.

INSERT TABLE 4

To further explore this, I first ran a multiple regression analysis with each of the mechanisms entered all at once as independent variables and coordination as the dependent variable. Results revealed that as a group they accounted for 68.5% of the variance in intradepartmental coordination and 42.4% of the variance in interdepartmental coordination (See Table 5). However, when I entered the variables step-wise, it is clear that Resource Knowledge plays a more significant part than the other variables for interdepartmental coordination, accounting for 30.1% of the above variance. In step two SOCM ads an additional 7%. For intradepartmental coordination, it appears that Relational Knowledge is the primary contributor accounting for 53.5% on its own) and Resource Knowledge adding an additional 12% in step two.

INSERT TABLE 5

Testing other variables. As noted there were several other emergent concerns from Phase One. Some of these were analyzed in Phase Two. These additional questions looked to perceptions of leaderships, supervisors, and the differences between Librarians and Non-Librarians. First to determine how perceptions of the workplace might affect the variables correlations were run comparing each of the perception variables against the mechanisms as well as both intra- and interdepartmental coordination (See Table 6). For both personal perceptions (Personal Organizational Perspective) as well as perceived perspective of the supervisor (Supervisor Organizational Perspective) there is a relationship between increases in more positive impressions of the organization and an increase in all the variables, with the

exception of SCM, SOCM, and routines. There appears to be a negative relationship for SCM with both variables. Finally SOCM is only significantly related to personal perceptions of the workplace and Routines are not significantly related to either.

INSERT TABLE 6

More importantly however is the apparent impact these variables may have on the effectiveness of the mechanisms in attaining coordination (see table 7). When both variables were added to the stepwise regression analysis for interdepartmental coordination Personal Organizational Perspective replaces Resource Knowledge as the most impactful, accounting for 32% of the variance. In step two Resource Knowledge adds 9%, and in step three SOCM adds an additional 4%. Interestingly it is an excluded variable for intradepartmental coordination. Alternately, it seem that Supervisor Organizational Perspective does not impact the regression analysis of interdepartmental coordination, but is included in step three for analysis of intradepartmental coordination adding an additional 3% in explanation of the variance.

INSERT TABLE 7

To examine the differences in perceptions of Librarian versus Non-Librarian I first conducted an independent sample t-test and compared the answers for Librarians to those for Non-Librarians. There was only a significant difference for the first questions that asks if there is a status difference. Non-librarians were more likely to note that librarians had a higher status, though in general both groups seem to see librarians as higher status with an overall mean of 4.82 on a scale of 1-7.

INSERT TABLE 8

The following chapter will more fully explore the above relationships as well as thoroughly encapsulating the results from both phases of research.

Chapter Four

Results

Greene (2008) notes that data integration is of key concern when conducting mixed methods research. She argues that one way this can be done is through major analysis to establish inference and conclusions, and another way is by comparing data side by side. However, Guest (2012) notes that the researcher should remain focused on the research question and the best way to answer it. Following this advice, this results section presents the findings congruently when possible and notes how both qualitative and quantitative data inform each other. Using the proposed theoretical model as a guide for the organization of this section allows for an examination of the ways the specific model concepts and hypotheses were either supported by the data or not.

The two proposed moderating/mediating variables (uncertainty and interdependencies) will be integrated into the results differently. Uncertainty will be integrated in two ways. First, the argument that change is associated with increased uncertainty will be examined in a stand-alone section. Then further discussion of uncertainty will be incorporated in the results under each mechanism heading as indicated by the hypotheses (H1a, H4a, H6a, and H9b, H12b) rather than as an independent section; This is done for two reasons. First, uncertainty is present in some way in all attempts at coordination and, second, it impacts many of the mechanisms in ways that would make discussing the results difficult without this integration. Interdependencies will be discussed briefly in a separate section.

I then move into an examination of the results as they pertain to each of the proposed mechanisms: Organizational Mechanisms (SCM, CIM, and SOCM), Routines, and

Knowledge Mechanisms (Relational and Resource). This includes how they impact coordination as well as the ways they interact together and with the other variables in their relationship with coordination. Finally, primary emergent themes that did not match the proposed theory (personal perspectives and the effects on coordination, supervisor perspectives on the organization, and perceived status differences between librarians and non-librarians) are presented, as well as results that do not clearly fit into any of the sections above.

Throughout all of the aforementioned sections, the following research questions (which were generated in Chapter 2 and that were at the core of analysis) will be addressed as each component of the model is tested.

RQ1: How do the lived experiences of organizational members of a complex organization align with the proposed theoretical model?

RQ2: How do the lived experiences of organizational members of a complex organization differ from the proposed model?

To keep the focus on the model, the following sections align with the arguments made in the presentation of the theoretical model rather than specifically along the hypotheses. Table 9 summarizes the key results of Phase One. This allows for a deeper exploration of the ways the model was supported or not. The results specific to the hypotheses are integrated into the discussion and noted when addressed.

INSERT TABLE 9

Change Makes Coordinating More Salient - Uncertainty

One the first arguments made for using this particular organization as the research site was that coordinating would be more salient during times of organizational change. Although

this is not specifically something that is integrated in the model, it does emerge as impacting the amount of uncertainty, which is identified in the model as one of the antecedent variables. The concepts of change (or impending change) as affecting levels of uncertainty, and of uncertainty as affecting the coordinating process, were consistent themes throughout the qualitative data. [Concerning transcripts of the interviews: Note 1: unintentional vocalizations like umm, ahh, and other fillers that did not add to the meaning are removed from quotes. Note 2: names or references to individuals and /or specific departments that could be identifiable have been changed throughout.]

In almost every interview, and often throughout observations, uncertainty tied to the changes in the library were mentioned. These ranged from the extreme of:

> This project on top of all the management changes is making everything difficult; I don't know where we will be, who to talk to, or even if I'll have a job. I see it all around the library; people are worried about what is happening. (Librarian1)

to a much more positive outlook of:

> Sure, there is a lot going on, but it is really great, the new additions to the library, and all the work that "University Librarian" is doing to move us forward, it's just great, I mean that is not to say that it isn't a bit scary and I see why people might be anxious not really knowing what everything will look like, but its gonna happen anyways. (DeptHead1)

There were several departments that tended towards one end of the spectrum or the other and, as will be discussed below, this may in part be due to the ways their supervisors see change. It also is important to note that not all participants saw change as having much of

an impact at all. There were three respondents who seemed unaffected by the past or impending changes. Staff1 experienced more change than many of the participants:

> We are about to get a new head of the department. We had the same acting head for the past … years. Someone new is coming …, so that will be an interesting change. And we will also be moving to the new building, so we have been preparing for that move, and with all the construction, it feels like a lot of change is happening but we are still here and we are still functioning normally. It's not like we are not able to do our jobs.

Even though he seems unconcerned, he mentions that change is creating uncertainty; however, he just doesn't seem to be concerned with managing it.

Interdependencies

> Hypothesis 1b: Interdependencies are positively associated with the use of SCM.
>
> Hypothesis 4b: Interdependencies are positively associated with the use of CIM.
>
> Hypothesis 6b: Interdependencies are positively associated with the use of SOCM.
>
> Hypothesis 9b: Interdependencies are positively associated with the use of Resource Knowledge.
>
> Hypothesis 12b: Interdependencies are positively associated with the use of Relational Knowledge.

Interdependencies need to be addressed independently of the other variables for two key reasons. First, interdependencies are at the core of what is being aligned so it is at the core of all aspects of coordinating (i.e., without interdependencies, there is nothing to coordinate). Second, they are sufficiently complex that a brief discussion will assist in framing the rest of the results. A surprising outcome of Phase Two data was that

interdependencies were not as clearly associated with the mechanisms as expected. The only significant relationship found were between intradepartmental interdependencies with SCM and interdepartmental interdependencies with COM and SOCM. More surprising these last two emerged as negatively associated, even if only slightly. This may be due to just how complex interdependencies can be and thus the difficulty in measuring them.

As presented in the literature review and theory development sections, even though there is consensus that interdependencies are at the core of coordination, conceptualizations of interdependency varied widely. There were researchers who viewed it specific to the task and identified typologies like pooled, sequential, reciprocal, and team (Thompson, 1967; Van de Ven et al., 1976), or task-to-task, task-to-resource, resource-to-resource (Crowstone, 1997), as well other typologies.

These typologies can make sense when looking at specific tasks as separate from the larger context. However, one of the first realizations that I had in this research was that interdependencies intertwine in myriad ways. Therefore, looking for what type of interdependencies exist when looking at organizational coordination is less useful than identifying the extent and complexity of those interdependencies. That is, all organizational members, units, departments, and divisions are interdependent, as they all belong to the same overarching organization and at the end of the day they all function towards a broad goal. They all have webs of interdependencies, but the complexity and extent vary. Consider, for example, members of the most siloed division of this library. They have been semi-autonomous for many years, but they still require fiduciary resources, have a member who attends department head meetings with the library, refer patrons to other library staff and have other library staff refer patrons to them, require the use of equipment in the main

library, and are guided by the same HR rules and regulations, as well as interact internally to get work done (though much of their work is independent).

At the other end of the spectrum is another small division whose members control special events as well as outreach and academic collaboration. Though there are only a few team members, they need to work with the various collection specialist to get materials, with administration to plan and budget, with technology information to keep the website up to date and operating correctly, and with staff to write content, as well as all the typical things like payroll, training, HR, among others. There are also those units/departments who by design interact with every other department, including administration and technology management. Staff12 points this out:

> I am part of more than one unit. So this is where it becomes so difficult. So I am IT, part of IT. 'Cause I have access to servers and I have control of that type of thing. But I also, because they are all my customers, the whole library staff are my customers.

An additional challenge in identifying specific interdependencies in this case is the nature of an organization undergoing vast change and the shifting of roles that comes with it. This organization has several people who are either formally or informally straddling several roles, are in temporary roles (e.g. acting AUL, acting Department Head), or are performing two roles (such as UnitHead4: "this unit is really supposed to be run by two people, but the other position has gone unfilled for a couple years, so now I just do both…").

Although the quantitative data gathered to explore these hypotheses offered little insight and may even indicate the need to re-conceptualize interdependencies somewhat Phase One data offers some interesting perspective on interdependencies and coordination. As is argued above and as will emerge from the discussion below, there are certainly some

indications that interdependencies affect the use of the proposed coordinating mechanisms – and this offers some support for each of these hypotheses. What is less clear is how. There are indications that those divisions that have fewer interdependencies rely less on coordinating mechanisms. There also are departments whose members are highly interdependent both internally and externally to their department, but that seem resistant to any attempt at aligning work. The reasons behind this will be more fully explored below. As noted, throughout the rest of this section interdependencies will be at the core of much of the discussion, but often implicit as the underlying "what" in what is being coordinated.

Organizational Mechanisms

The mechanisms that represent the discursive level of consciousness are the broadest category and include Structural Coordinating Mechanisms (SCM), Conscious Interaction Mechanisms (CIM), and Stored Organizational Mechanisms (SOCM). They were proposed to be easier to observe than the other mechanisms. This was found to be true throughout Phase One. All three emerged in almost every interview in some way (as well as in observation), and at least one emerged in every interview.

There is an argument to be made that these were mentioned consistently because the interview protocol asked specifically about each of these mechanisms, with questions such as "Were there any materials you were given, like manuals?" or "How are you informed about change" (with a follow-up specific to some change in their department). However, there are two indications that these mechanisms were more salient for participants. The first is that when asked more general questions pertaining to coordination like, "How do you know what you are supposed to do" and "can you walk me through a typical day", the themes that emerged most readily indicated these mechanisms as present. Second, participants seemed to

find it easier to answer questions that explored these concepts. They answered more quickly, they understood the questions more readily (e.g., asked for examples less often), and required fewer probes on the part of the interviewer to get an in-depth response.

Structural Coordinating Mechanisms. These are those structures created in an organization that function to constrain and enable interaction, including rules, roles, physical space, power structures, and formal information systems. There were three distinct claims made in the presentation of the model. First, SCM are established at two points, through planning by the organization and through interaction of organizational members (often in the process of coordination). Second, planning can be both non-physical though observable (e.g., hierarchical arrangements, and established rules), or physical (e.g., space design). Third, through the interaction of members -- as they enact and experience coordination -- these mechanisms are (re)created. An additional claim was presented as a proposition, but not integrated into the hypotheses and stated that SCM are enacted through communication. Two hypotheses were proposed:

Hypothesis 1a: Uncertainty is positively associated with use of Structural Coordinating Mechanisms (SCM).

Hypothesis 3: SCM are positively associated with extent of coordination.

Quantitative data supported H1a and through the relationships was only moderate the significance was high. Interestingly the results for H3 were not as expected, indicating that there is a negative relationship between SCM and coordination. There are several things that might be affecting this, not least of which is the challenges some participants had with their immediate supervisors. The possible reasons for this difference will be more fully explored below and in Chapter 5.

SCM are established through planning (either physical or non-physical). The experience of the participants of this study support the delineation of SCM into the physical and non-physical, as both were regularly mentioned by more than half of the participants. Examples from below include the ways that changes to space design and proxemics can impact work, and the adoption of roles both formal and informal. These were expected. More interesting are the different ways that these were manifested for the participants, and that participants experienced these somewhat differently than expected.

Physical SCM. We often do not think about the physical aspects of our organization and how they affect coordination, unless something is not right. If things are running smoothly and things are where you need them and expect them to be (including people), then it would make sense that these are conspicuous. However, when new spaces are being designed, when whole departments are put in a space that is not properly designed for them, or when teams that work together are separated, the effect of physical space on coordination becomes more salient. This held true in this data. There were no questions on the protocol that specifically asked about physical space; it. It was only through participants bringing it to the forefront, or through probing some other question, that these topics emerged. They centered around two conceptualizations of proxemics: interpersonal proxemics and divisional proximity.

Proximity was mentioned by 10 different participants as affecting interpersonal communication/relationships, and thus coordination. On the positive side, being in near proximity, and thus fostering greater ease of contact, was noted as one of the contributing factors to better coordination: "'Leader's office is right here and so we all have easy access to her and to each other. It just makes it easier when I can just stand up and say something over

the top of my desk" (Staff3); and, "there are three units all right here and so, when we need something it is easy, and when we need help or they need help it is easy to just step over and help" (DeptHead2). There was also evidence that the lack of proximity was an issue for coordination:

> I used to be on the same floor as my boss and had a really great relationship, we could talk face-to-face almost anytime we wanted, but 2 months ago they had to move us for construction and they divided the department among 3 floors, so now we email more and it just doesn't work as well. I feel like I don't get as much done (Librarian5)

An interesting counterpoint emerged in an experience highlighted by two different interviewees who work in separate units that are highly interdependent. Both noted a version of Staff4's account of an issue with proximity:

> Our department and department x are kind of in the same space and so all the unit heads are cross trained to help if another unit head is out or if it gets particularly busy. Which is great, but we are only cross trained on what the student workers do, not the more complex stuff and so we are really just an extra student worker and there are always plenty of student workers, so we have to go over and help, but end up feeling pretty useless. (Staff4)

So, even though the organization was attempting to utilize interpersonal proximity to increase coordination, there was a need for other mechanisms to be integrated in order to increase coordination. In the instance above, an increase in CIM specific to training on supervisor duties might have alleviated the issue to some extent.

As would be expected from an organization that is remodeling large swaths of its footprint, the experience of Librarian5 was not uncommon -- although organizational

members who were not being uprooted (and were not going to be) rarely talked about physical space in the interviews. Those who did noted the difficulty that issues with space can create. One department was not only uprooted from their typical space in the library, they were moved to a facility referred to as "the barn," which was at a different location on campus. This department expressed significant negative impacts of this move, including the difficulty in getting books to and from the main library, maintaining relationships with other members of the library, and feeling disconnected from the library. Staff6, an employee in this department, noted, "even the people whose work isn't impacted by the main library are just less motivate[d]motivated and feel like their work is disrupted because we are all the way over here."

A counterpoint to this negative perspective of divisional proximity is the Music Library, which existed in a facility separate from the main library for 20 years. They had developed heavily siloed, relationships, culture, and even policy, although they had been integrated into the main library both physically as well as structurally at the end of this research. The employees were split on the benefits of being separated, with two liking the independence and autonomy (one very strongly), and one speaking excitedly about integrating into the main library and the benefits it would bring.

Non-Physical SCM. Included in SCM as non-physical mechanisms were rules, procedures, formal hierarchical roles, and informal roles (both interactive roles, as well as a perceived hierarchal role difference between librarians and non-librarians). Rules and procedures were often identified as necessary for aligning tasks and were discussed in three ways. 1) Those who felt that things were acceptable: "we have new student workers all the time and the policies and procedures we have in place make it easy for them to know what

they need to do" (Librarian2). 2) Those who saw need for improvement, but took responsibility for creating them: "I am helping a lot getting procedures in place for simple candidate searches"(Staff2). 3) And those who saw the need, but did not see the mechanisms as adequate in the current state: "There was no communication and no processes in place So, um yeah, there were a lot of things that I saw needed work. I'm not sure I'm doing much" (Staff5).

Roles were of particular interest, as it was surrounding them that several unexpected themes emerged. On one hand and as expected, formal hierarchical roles was one of the primary conscious ways this organization attempted to align workers. As a highly bureaucratic, state-run institution there are multiple levels as identified in the methods section. The expectation that there were specific chains of command that were intended to align members was well understood here. But what emerged was the distinction between those in supervisory positions who were respected/liked and those who were not. It is at this point that the (re)creation of these mechanisms through interaction can most readily be seen as will be explored next.

SCM as (re)created through interaction. The (re)creation of roles as a mechanism occurs in the negotiation of those roles and the accommodation of organizational members to each other. As just noted, as a highly structured hierarchical system, roles were generally assigned in specific terms, even if there were some roles unfilled, some people filling more than one, and some roles that were changing due to planned change. Even though people are assigned formal roles, members also take on informal or unofficial roles in attempting to align tasks as well. This can happen when they do not feel that the role is being filled (as in the example of creating processes above) or when it makes sense based on expertise,

> There were also a number of students at the time who'd been there a while, and they were able to show me the ropes on the things they do all the time. The people that I would in the future be supervising actually trained me. (Librarian3).

Additionally, evidence of the negotiation of formal roles was common, especially in instances where new leaders were discussed. Consider when Librarian4 discussed the ways that her new manager came to grips with managing his team:

> Well, definitely "Supervisor" had to kind of get comfortable with his role. I think this was a pretty significant step up for him, from his last position. So I think he had some growing pains there. But, he figured out his place and we figured him out (Librarian4)

There is no formal designation of hierarchal power differences between librarian and non-librarian (other than those designated as UL or AUL). However, an unexpected theme emerged revealing that at least some members of the organization recognized this status as hierarchical rather than just structural. In one of the early interviews with a member of library staff who does much of the work of a librarian within one of the more siloed departments, the member was adamant about his perception that librarians do not see non-librarians as equals. He could not articulate how this was manifested behaviorally, but even if there is no evidence of this emerging from interaction, it certainly must affect interaction at some point. To look further into this, I added this to the interview protocol and found that of the non-librarians asked (N=22), 12 noted some sense of librarians' status difference. However, among the librarians who were asked (N=18), only 5 noted anything about a status difference and of those, 2 identified as it coming from the non-librarians. This informed Phase Two research and questions to investigate this more fully were added to the survey instrument. Though quantitative results were mixed, there certainly was an strong indication that in general both

librarians and non-librarians feel librarians are higher status. Additionally, as indicated by the Phase One date it appears that non-librarians more readily recognize the status difference.

Although the fact that these roles are (re)created through interaction was not unexpected, the effect that this interaction could have on coordination was. The interactive style and relationship of the supervisor to the supervised, and of the supervisor with those higher up the chain of command and the ways that affected coordination, emerged as major unexpected theme and will be more fully explored below in the presentation of unexpected results.

Summary of SCM and its relationship to coordination. As noted, the initial quantitative results indicate a slight negative effect of increased SCM on the extent of coordination. This was not supported in the Phase One data, but some reasons for the unexpected results did emerge. SCM seem to lead to better coordination, but there are three important caveats: 1) SCM must be managed positively,; 2) they heavily interact with the other mechanisms; and 3) relationships are key (this last caveat will be discussed individually below). Lack of SCM can be seen to negatively impact extent of coordination, as AUL1 notes when talking about some new tasks they are being assigned: "… we don't necessarily have the processes in place to actually do them in an effective means. So, we're sort of just running around like a bunch of chickens with our heads cut off." Even when SCM are there, but are not well managed, they can have negative consequences. This includes dissatisfaction and dissent, such as UnitHead1 offered:

> But, I do feel like I play goalkeeper between my folks getting their work done and then changing processes coming down. Thus far – and this is personal opinion - a lot

of the change procedures have just come down. No one has asked us what works and what doesn't. You know, what do you need (Unithead1).

This last example also illustrates the fact that these mechanisms work together and if one is poorly managed or implemented it can derail other more positive attempts. This is also shown in the examples of the frustration experienced by Staff4 above.

Conscious Interactive Mechanisms (CIM). CIM are proposed to involve any interpersonal or group communication to any member of a group by an organizational member external to the group in an attempt to facilitate coordination. This was presented as often being intended to reduce uncertainty and as involving not only face-to-face, but also small group and mediated communication. Hypotheses included:

Hypothesis 4a: Uncertainty is associated with use of conscious interaction mechanisms (CIM).

Hypothesis 5: CIM are positively associated with the extent of coordination.

Quantitative analysis did not offer significant support for H4a, but did support H5. Increased CIM was associated with moderate increases in both intra- and interdepartmental coordination. Additionally, the qualitative data generally supported the overarching claims in the model and offered some support for both H4a and H5.

CIM to reduce uncertainty. With the level of uncertainty that existed in this organization as a result of all of the change, it was expected that CIM would be one of the more commonly talked about of the mechanisms (even noting that Organizational Mechanisms in total were expected to be particularly salient). While reduction of uncertainty was a common theme in discussions that involved CIM, interestingly most of those

discussions did not involve any of the major changes, but instead often referred to new employees. Particularly relevant comments include:

> Yeah, so obviously when I just started I was unsure of what to do, even coming from another library so he [supervisor] used demonstration. And then over time he would teach me different things. Like, this is how you do a special collections; this is how you process a PDF; this is how you do a. . . . Yeah, always through demonstrations. There were no online demos. (Librarian6)

and:

> Whenever I get a new worker I always spend more time with them, I want to feel like they know what is going on, so I meet with them, take them to meetings to see how things get done, and then as they seem more comfortable I don't as much. (UnitHead2)

The reasons for the focus on new employees may be that there is an expectation that new employees need or want more guidance, or that when new employees are brought in the role of the supervisor or trainer is to impart this knowledge (which would indicate interaction between the mechanisms).

Most of the conversation about how the changes were communicated did reference using CIM, but did not explicitly indicate that it was to reduce uncertainty. This may be in large part due to the implicit understanding that training, managing relationships, and presenting information are reducing uncertainty (not knowing what to do, how to act, or what the future holds, respectively). Although not often explicitly related to reducing uncertainty, the use of CIMs to align organizational members was a common theme in the qualitative data, including aspects of face-to-face communication, the use of groups (both small and

large), and the use of mediated communication. There were several unexpected themes that emerged, including a recognition of two additional conceptualizations of CIM as well as some interesting ways that mechanism interact.

Face-to-face mode. Face-to-face was by far the mechanism most positively mentioned by the participants, face-to-face mechanisms are seen as more necessary with new people or new tasks (as seen above), and as more desirable and efficient (as noted by Librarian5). Face-to-face is also the desired mode when discussing things that might be challenging, whether that is conflict oriented, or addressing some error in work. Staff7 noted that when his manager has an issue with his work, she tends to email or just leave it on his desk with a note on it. He said, "I get not wanting to talk about it, but it really frustrates me, just talk to me so I can ask questions and get things right, right away". DeptHead3 pointed out that when she needs to give feedback to someone, "it is so much more powerful in person I can see how they are taking it, ya know read their face and make sure we are on the same page". Interestingly the supervisor (DeptHead4) of Staff7 even noted the benefits of face-to-face when she said, "When there is a new policy or some other thing, I wish they would just talk to me about it". Though there were generally positive reactions to face-to-face communication, a few people noted the amount of time it could take as a way to align work. AUL2 said, "I would love to meet with everyone one on one, but I just couldn't do that and get anything else done, I used to do weeklies [once a week meetings] when I had fewer people under me, but…" One final note is that these face-to-face meetings run anywhere from an hour or two for more in-depth topics (reviews, trainings, etc). to brief check-ins, "once they have been there awhile I will just do a little one, like a mini – everything cool, check" UnitHead4.

Group mode. Another very common mode for aligning organizational members was the use of group settings. These meetings include the large all-staff meetings that are held quarterly, departmental meetings that vary in frequency within departments, some unit level meetings, UL-facilitated executive level meetings that occur weekly, and department head meetings that recur monthly. Additionally, there are a variety of cross-functional committee meetings and ad hoc meetings to address specific concerns or areas of interest. The larger format meetings, including the all-staff and the departmental meetings, are generally designed to reduce uncertainty and disseminate information. Throughout the construction project, a portion of each meeting was an update on construction as well as the next things that were going to be moved, moved back, or changed. I found the all-staff meetings were overall well attended by most departments, but that several departments had low representation, and several small groups of attendees could be seen reacting negatively to the discussion of the library construction project (specifically during discussion of the timeline), and were heard audibly scoffing at several points. When asked about this, one of the participants that was in that group said, "they tell us these things and then they don't do what they say they are going to do." After prompting to further explain, the individual said, "Well, they either change what they said, or don't really care what we think, it is just, here it is…deal with it." Note this is from a source that was dissatisfied with management in general and from a team that seemed to share this sentiment, but it does expose one issue with large format meetings.

With large format meetings, there is only so much time for feedback from the audience and some voices and questions can go unheard. After one of the all-staff meetings, I heard several conversations on the way out that centered on questions they felt were still

unanswered. In three of the interviews there was a clear sense that the all-staff meetings were not as effective as they could be. Though these meetings were designed to inform the staff of progress, impending changes, and other organizational concerns (according to the UL), there was much more information that was intended to be presented in meetings in a cascading fashion from executive meeting, to department heads, to unit heads and representatives, and then to staff. This was brought up in several of the executive level and department head meetings, although it was also noted that not all departments were fully participating in this plan. This seemed only as effective as the boundary spanner between levels. At the highest level there were the division heads, who then met with the department heads, who then met with the unit heads (and individual reports), who then met with their teams. This worked well for those divisions that were highly functioning and had a strong relationship. However, if any boundary spanner in the chain (division head, department head, or unit head) had a negative view of either the library management or of their work, the meetings from then on down seemed to be more negatively viewed or were not held regularly (or at all). This speaks directly to the emergent theme of the power of relationships and will be more fully explored later.

I did not observe or record departmental or unit level meetings, but these did come up in the interview data in some interesting ways. Several members noted that these other meetings could be useful, but could also get overwhelming when there was other work to do. This also was an issue with some of the cross-functional groups that met. However, even though the additional meetings could be a burden, their benefit was mentioned by the four people that discussed them. For example Depthead5 said:

> It's another meeting that you have to fit into your schedule, so it's not easy to do. But the meeting that … every week, it's called the "Special Interest Group", and that group is composed of me,…and a representative from each department. So there is the head of "department1", the head of "department2", and the head of "department3" there at least, if the head cannot come, they appoint someone else. (DeptHead5)

These groups are perceived quite positively by the 4 members who mentioned them, and as they were discussed in the department head and executive level meetings. This same group was referenced by Depthead3, who is in the above referenced group as well as another cross-functional group. He says, "Morale at the library was super low 4 years ago. It was just people trying to work as fast as possible and leave. The meetings have allowed them to make work connections across departments," implying that these types of groups meetings have increased morale.

Another type of group that was only mentioned by three members, each in the same department, were quick huddles that one of the unit heads had integrated into her team in response to both the rate of changes (due to the work on the library) as well as to the overwhelming amount of emails noted below. She indicated:

> With my own folks, I really strongly prefer to use it [email], even though they're sitting next to me. But then, I realize it's a noisy channel, so we've also started having- we call the huddles. We have like little, daily stand-up five minutes at the end of the day, right before my morning guy leaves. And so, I don't know, we're probably going to keep doing that. We started doing them strictly because of the move because there was so much stuff going on every single day. (UnitHead3)

The other participants spoke highly of these, and it would seem from this limited data that at least for this group they are an effective way of aligning work. A final way that group mode was used is for group trainings that include new employee orientation as well as trainings for specific knowledge. I did not observe any of these occurring during the course of research, nor were they explicitly mentioned by leadership when questioned about training methods, but they were mentioned by 2 participants. For example, one noted:

> I also had some training that was not because I was starting a new position, it was more because all the catalogers were going through the same training at the same time and it just happened to take place about a month after I started. And then there was an orientation for new, I think all new employees, so I had that. (Librarian7).

Mediated modes. The most widely used and disparaged mode was email. Even those who admit to regularly using email disparage it: "I use all channels with him. I'll pick up the phone and call him, I'll pop my head in his door. I'll email him, and so far, I prefer to use email, but I know it's a noisy channel" (Staff8). The issue that was most commonly brought up is the ubiquity of email. Three separate participants said almost the exact same thing as Librarian6,:"There are just so many of them [emails], it is so hard to figure out which ones to pay attention or to even want to." The problem with this sentiment is that it seems to be the preferred way for Library leadership to disseminate information specifics about the change. So this led to important information getting missed by organizational members, like Staff9. When asked how they know what changes are happening due to the library construction project, Staff9 responded: "I guess emails, but sometimes I would just not look at that because there were just so many. Like, oh we will be moving carpet from some stairs, those stairs won't be able to be used." And then later when asked about challenges she said, "well,

I didn't realize that we were moving one of the collections, now that I think about it they probably told me in an email, guess I should read those better." So even though this is the preferred method there are challenges for organizational members due to the number of emails that are being received. Other mediated modes mentioned include phone, though only two people even briefly mentioned it, and notes, which a few people mentioned in passing (including the Staff7 above). A final mediated mode was more unexpected and is further explored below.

Unexpected CIM. Three things were unexpected, but fit within the area of CIM. One was the emergence of some mediated modes that I had not thought of, the second was the absence of chat as a communication tool, and third was indirect one-on-one interaction that will be described below.

One area of mediated modes that was not discussed in the model development is tools that I had more readily thought of as SOCMs. These include things like Oracle Calendar, the request management system, and the IT department's "The Help Desk". With each of these, the initial core intention is not as a communication device, but in each case they have been adapted as such. The capability is specifically built into the calendar system in the ability to send calendar invites, but I observed on several occasions that it was being used as AUL3 employed it:

> I use the calendar as a way to avoid emailing. I can get on there and see when they have available to meet with me, and if there are more than one person to get there, I can find that out too and then send them an invite right from there with a note as to why and then if they can accept or whatever. It's great. (AUL3)

The second technology, the request management system, was not designed as a communication tool, but as Desanctis and Poole (1994) noted, organizational members adapt technology to fit use rather than intent. This is also referred to as re-invention in the diffusion of innovation literature (Rogers, 3003). Librarian5 said:

> The new request management system, we used it for things that really wasn't expected to be used for. We used to have to order these conservation boxes and we would just make these little slips [to say what we needed]. Well we have this new system now that will make these lists for us automatically, why don't we just put them there. (Librarian5)

So, even though the request management system was not specifically designed to communicate the need for conservation boxes, Librarian5 used it in this manner.

Finally, "The Help Desk" was established and designed to enter technology support tickets, but that is also used now to more fully assess need by asking some questions within the system, allowing IT to better prioritize its time.

The absence of Chat as a mediated mode was not explicitly expected or noted in the development of the model, but was glaring in its absence as I analyzed the data. Large organizations are moving more and more to Chat features for quick communication between members, but not a single participant mentioned Chat as a way they communicated. This is something that would be interesting to explore, but the realization came too late to follow up with participants.

The final unexpected mode emerged from a conversation with UnitHead5, who noted that it was common for him to not interact directly with the person every time, but rather

interact with their work (what I will call “indirect one-on-one communication”). This is evidenced here:

> Depending on the task that they’re working on, I would just kind of walk them through it; this is how you do it. They’ll do a certain section of it, and then I’ll check their work. When they’re first starting out, I’ll usually work right next to them, and do the same task while they’re doing it, so I can kinda watch what they’re doing. And then, I’ll kind of slowly phase out to having one of the more experienced students kinda watch what they’re doing, and different tips, to just sort of sporadically checking they’re work, to you know, once they’ve been working for a long time, they don’t really need much supervision. I’ll check their work at the end of the day. Unithead5

This suggests that there is a component to CIM that involves interacting indirectly with supervised staff rather than directly. This still integrates components of CIM, as it is conscious and is an attempt to align work. A similar comment was made by Staff10 (who supervises some student workers):

> When I am first teaching them the task I will be right there with them, first in going over it and then sometimes right over their shoulder. After that initial first day or two, then I’ll just kind of check their work. They’ll finish processing a stack of books, filling out mailing slips, stuff like that, and I’ll just individually go through them all. And then, what I regularly do with everybody is just once a whole cart of books is ready for patrons to pick up, there’s a few basic checks that I do, just to make sure that the things that could go most drastically wrong, haven’t gone drastically wrong. But I don’t check everything.

There were four other participants who mentioned similar methods of coordinating work. In each of these cases, feedback was offered more often when things were incorrect. For both inexperienced and experienced employees, this was done either in person, or, in two cases, with notes attached directly to the work. However, 3 of the participants noted they were not always as good about telling their staff when things were correct, particularly when the employee had been working for them for some time.

Summary of CIM and its relationship with coordination. As noted, the quantitative results indicated a positive relationship between the CIM and coordination. As can be seen throughout the discussion above it is well supported in the qualitative data as well, although some modes seem to be more effective than others. Face-to-face is well liked and recognized as a powerful means of aligning work. “Meeting in person is just so much more effective. I don’t know if I could get everything done, if I didn’t have check ins with ‘my boss’” (Staff11), though it takes more time (as AUL2 noted above). It would seem that face-to-face is most commonly used to align initial work, realign work when not meeting standards, and to keep relationships managed. From an organizational standpoint, the two primary means of communication with the intent to attain coordination were meetings (large format all-staff meetings as well as cascading meetings starting with executive level and then moving the information down to the staff through increasingly focused levels of organizational function) and emails.

Meetings are very common at almost every level of the organization, but their level of success at attaining coordination varies considerably. The large format all-staff meetings were positively perceived by some members and acknowledged as the most efficient means of disseminating large amounts of information quickly by several, including the executive

management level. These can only be effective if the members a) show up, b) listen, and c) do not already distrust what is being said. The cascading meetings were seen as effective for those divisions-departments-units-staff whose boundary spanners had a positive view, although they could get in the way of work when too many meetings were being scheduled. Finally, cross-functional teams were noted as having generally positive impact not only on aligning work, but also in fostering more positive feelings towards the organization and across departments.

Mediated communication was generally seen as the most used and was identified as leading to increased coordination through a decrease in uncertainty. However, the amount of noise in this channel caused some problems and led many to see it negatively. If one could sift through the noise, the information was there; but it was difficult to find at times. It is also in mediated modes that we clearly see the ways that through interaction organizational members (re)create the coordination mechanisms in the adapting of the calendar and the request management software to be a communication tool rather than just a repository of information.

Stored Organizational Coordinating Mechanisms. SOCM are any artifact that is created by the organization that does not require direct interpersonal interaction in the facilitation of coordination, but exist for that reason. These include training manuals, budgets, plans, databases, or any information that is stored for later retrieval to assist in achieving higher levels of coordination. Additionally, it was argued that they a) are often initially created as a component of CIM, b) take some agency on the part of the organizational member to access, and thus c) are only as useful as organizational members' willingness to access them. The hypotheses for SOCM include:

Hypothesis 6a: Uncertainty is positively associated with the use of Stored Organizational Coordinating Mechanisms (SOCM).

Hypothesis 7: SOCM are positively associated with the extent of coordination.

Uncertainty was not found to be related to SOCM, though it was nearing significance. However, there was evidence that there is a modest relationship between SOCM and both intra- and interdepartmental coordination. Additionally, and as discussed next, the qualitative data generally supported the overarching claims in the model and offered further support for the hypotheses as well as offering some unexpected results.

SOCM as created. The model argues for SOCM to occur as an outcome of coordination, and at least occasionally as an artifact designed to be used in CIM. A number of participants spoke specifically about creating artifacts for use in direct interaction that were to be accessed later. These included 6 people who had been involved in creating training materials, which included orientation manuals, task manuals, and training manuals. As Librarian7 stated, "when I started there wasn't much that told the students what to do, so I spent some time working on writing down some basic procedures and processes, even after they are trained they are there if they have questions." Even when the interviewees were not the creator, they generally recognized that these were created with the goal of aligning work. Staff13 said, "I know someone had to create the manual to help, but it just doesn't make sense to how things are done now." This speaks to the fact that just because they are created or used does not necessarily mean they are effective. Staff13 showed how these artifacts are (re)created in interaction when they added, "so we took what worked and changed what didn't so that it made more sense in training the next people that came on." These are created not just at the lower levels, but are created throughout the organization. The

executive level team created an annual budget that was then referenced by organizational members to guide purchases, scheduling, and internal planning. From the strategic planning session, a mission statement emerged that was designed to align organizational members actions. Department head and unit heads created schedules to match work to required workflow.

Much of the above SOCM exist in physical form even though they may have been stored digitally. More commonly mentioned were digital structures that have been created to store information, including wikis, the library website, Oracle Calendars, a shared network-drive, the integrated library system, an employee management system, and "The Help Desk" referenced above. As with the physical artifacts, departments and even units have their own digital repositories, as well as accessing those that are more organizationally ubiquitous. Like the physical SOCMs, the digital were (re)created through interaction.

However, there are two important differences between the physical SOCMs and the digital. First, the digital SOCMs are much more easily manipulated (with some important exceptions noted below), and thus are much more susceptible to being adjusted. The wiki was referred to by three people as a "living document". This living aspect allows these digital versions to react more readily to change, as noted by Librarian2 when asked "how did you get back in the groove after the change?". She responded,

> We document our procedures and how things should be done, and so I have all these instructions, which live somewhere on the wiki. I can very easily refer to them. I'm constantly updating procedures to make sure that it is straightforward and understandable. The Wiki is for both me and the students, I probably use it more than the students. (Librarian2)

The second way that the physical and digital are different is ease of access and use. There are many examples of this, from the ease of entering a help ticket and negotiating the severity of the issue without leaving one's desk, to the example offered by Librarian8, "before we had the website updated, if I wanted to know something, I would have to know who knew or email someone to ask, but now, even if I am home I can get most information that I need."

This last point is, however, not a unanimous opinion. There were plenty of examples of dissatisfaction with the ease of digitally stored information. Some involve the complexity of the system or disorganization in the case of the network drive:

> It's basically the dumping ground for all kinds of crazy documents -- anything somebody doesn't know what to do with, they dump on the (network) drive. So, it's become this monumental, it's just a mess, it's disorganized. It's like your worst nightmare of your walk-in closet or something. (Staff12)

Another issue came from Librarian8, who is responsible for one of the software tools that they use. While discussing what happens when there is a problem with it, he stated:

> The software is not written by us, it's a vendor, right? I'm responsible for the software, and I do the installation, and I do the maintenance of it. It's a daily thing, adding data and doing things. So if there is a brand new problem, the first thing I do is I try to find out if our documentation, or the support services of our vendor, if it covers that or not. And if it does, I read everything and hope I read the right thing. (Librarian8)

There were even some organizational members who noted positive aspects of digitally storing information, but still recognized issues: "It was paper, but I just did a digital

version of it, like a Wikipedia page, but then making sure that the student knew where to look for it could be challenging." (Staff15)

Requirement of agency and willingness. In probing reasons the participants did or did not access these stored resources, several common threads emerged. One thread was that there were materials that the participants did not look at often if at all. A common probe after asking about materials used in their training was "do you still access those?". Twenty-five respondents noted that they either do not access them or rarely do, and of the 10 that said they do still access them only 6 could identify when that was. Further probing indicated that the materials that were "just left on the shelf" included orientation manuals, training manuals (though several noted that for the first few months they did access these), and things they had uploaded to the network drive. Some artifacts that participants more commonly referred to were guidelines for specific tasks or procedures that were only done on rare occasions, and when assigned a task that was new to them. The reasons given for not accessing the information at all varied, but some common responses were, "I guess that there must be a place in which the rules and processes are written down but I have never seen or heard of such a place" (Staff16), and "I just don't think about it, I would rather just ask someone, it seems faster" (Staff3), and "finding anything can be so time consuming" (Staff7). The first seems to indicate that sometimes people are just not aware of the material, the second that it is perceived easier to just ask someone, and third that there are barriers to accessing the information. The third point is echoed by Librarian8: "there are individual, little books for separate, for different tasks. But as far as I know, there is no one place you can go to - to learn how to do everything."

Even among the 25 who noted there were SOCM that they did not access, there were also materials many of them acknowledged accessing. These materials fell into several categories. The first were those SOCM that were required as a core component for their work, including Payroll accessing schedules and hours, Circulation and Cataloguing accessing the library information system, and Human Resources accessing employee records. The reasons for this access are self-explanatory, although that is not to say that all members in this group were entirely satisfied with the SOCM (see Librarian8 above). The second category were those that almost everyone accessed occasionally in order to coordinate work, but that were not core to their jobs (e.g., using the Oracle Calendar to check availability for a meeting, or the payroll system to log hours). The third are those times where participants require information on something that so rarely occurs that they do not have the policy, procedure, or information memorized. A comment that mirrors what 4 others said included identification of procedures that require accessing SOCM: "there are a couple things that only happen once or twice a year, and every time, I have to go find out how to do it." (Librarian2). Additionally, 5 persons commented on a time where there was information they needed that simply did not come up often, as DeptHead2 recognized: "Just last week I had (Employee) come up to me and ask something about travel expenses, and so I sent him to the employee website that has that kind of stuff…union contract, travel request forms, that kind of stuff."

Summary of SOCM and its relationship with coordination. The relationship between SOCM and coordination appears to be a complex and multivariate one. The initial quantitative data showed a moderate effect, but some of the qualitative data indicated that this relationship is more complex. The general dissatisfaction with the network drive seemed

to keep people from using it, even though it was a huge storehouse of information, but the updated website, which seemed to be accessed more often, was praised for being well organized. There also is strong evidence for some SOCM to be vital for aligning work. Specifically, as technologies are integrated into an organization they then become part of the process. For example, there was a time when books were not tracked electronically, but now that they are the organization cannot go back and now relies on the technology to facilitate coordination. This is seen on a smaller departmental scale with HR. That department integrated software that allows them keep track of employees' records, including progress towards employment goals. An employee from HR noted:

> So, we can add employee info and lend different reports and see what we need to know. It's a network software so any of our supervisors, for example, if they wanted access to it, we could get them access to it. Once everyone is there we will do most of our tracking on the software.

Although it is not fully integrated into the organization, it already is necessary for this HR employee to do his job. Eventually it will be a required tool for anyone managing people.

Knowledge Mechanisms

Representing the practical level of consciousness, these mechanisms are proposed to function to guide behavior that is not based on specific easily articulated structures. Rather, these mechanisms function through an understanding of the aspects of the organization and how to interact with them. The model presented these as including two sub-types: Resource Knowledge and Relational Knowledge. The assumption in the model is that these are not only drawn upon to increase coordination, but also are created through that interaction. Additionally, it was claimed that these mechanisms are a) neither without thought, nor

completely conscious and b) and that they are somewhat more difficult to articulate than Organizational Mechanisms.

It became apparent that these were not as explicit as Organizational Mechanisms in developing the interview protocol. Trying to explicate levels of knowledge requires two types of questioning. One is about what people know. The other, more difficult line of questioning, is about what they do not know. This was done in large part by probing with some knowledge of the library and what resources existed. However, this was more difficult when examining Relational Knowledge, as those are often contextually grounded in the relationship between the individuals. The implicit nature of knowledge emerged in the interviews as well. While conversations about resources tended to flow well, the responses to deeper relational questions were more difficult. For example, the responses to questions like, "Who do you generally ask questions of?" a surface level question was generally readily answered. When the prompt "why?" was added, there often was a pause and a more careful consideration of the answer. But, when that was followed with "Who don't you ask questions of X and why?", many of the participants paused considerably longer, some looked around before answering, and some gave answers that were intentionally vague at first. That being said, the asking of these questions and the deeper probing offered significant insight into not only how knowledge impacts coordination, but they also were a catalyst to the emergence of one of the primary unexpected themes -- the power of the *quality of the relationship* to coordination.

Resource Knowledge. The model suggested that Resource Knowledge can function to increase coordination in three ways: knowing whom to approach to gain resources, knowing where information is stored, and knowing which member of the organization has

needed expertise. These include both internal and external resources and can be physical ("how do I get more paper clips"), expertise ("who should I ask about how to handle overdue books"), or knowledge ("who knows about books in our arts collection"). Hypotheses included:

> Hypothesis 9b: Uncertainty is positively associated with the use of Resource Knowledge.
>
> Hypothesis 10: Resource Knowledge is positively associated with the extent of coordination.

Phase two data strongly supported the relationship of Resource Knowledge with both intra- and interdepartmental coordination. This relationship was larger for Intradepartmental than it was for Interdepartmental, but both were highly significant. Support for the relationship with uncertainty was not as strong however with only a small correlation between the uncertainty and Resource Knowledge. The qualitative data also generally supported the overarching claims in the model and offered some support for the hypotheses, as well as yielding some unexpected results. Each of these is treated in turn.

Internal and/or external. As expected, there was evidence that Resource Knowledge involves knowledge both internal and external to the group. What was more interesting is that in discussing Resource Knowledge, comments included not only the participant's knowledge, but also regularly referenced others' Resource Knowledge. This included Resource Knowledge internal to the group, as Librarian3 noted:

> I was working on processing some of those more difficult request that we were having trouble finding a lender for. I would routinely go ask the guy in our department who's most experienced with that. You know, "I have this book, it's in

> Chinese, how do I find a lender for this?" He would give me some tips about where to look. (Librarian3)

In this way she represented not only her knowledge of who knows what, but also demonstrated his knowledge about resources (information). This two-level Resource Knowledge (knowing who knows, and knowing where to find information) was a common thread among interviewees, and was represented in the majority of mentions of Resource Knowledge. Arguably, this could be an artifact of the research site being an organization where one of the primary functions is the storage and retrieval of information. However, there are instances in which this occurred outside of primarily information-based departments, as well as times that the information was more generally applicable to many organizations. For example, as one staff member noted, "it doesn't matter what breaks, printer, copy machine, wall clock, anything, I know that 'Co-Worker' either knows how to fix it or where to find how to fix it" (Staff14). This same trend included those times when the resource was external to the group. Drawing from examples presented in other parts of the results above, knowing who knows where to find information on travel policies, knowing who to ask about computer issues, and knowing who has the answers to software issues, are all examples of Resource Knowledge that reaches outside the participant's work area.

Not entirely unexpected, but also not explicitly stated in the proposition on the theory, was the reverence given to those who a) have high Resource Knowledge and b) were known to share that information. This second blends somewhat with Relational Knowledge discussed below, but among those who discussed who they go to based on Resource Knowledge, persons who knew and gave information were often well regarded. Each also

was mentioned by 3 or more people. One individual who was discussed several times was Librarian9. As AUL1 stated:

> There are certain people that "Librarian9" knows have certain information over others. Working at … she tends to work with pretty much everyone in the library, which has led to her knowledge of who to ask for what. People know that and know she will help.

Another highly regarded Resource Knowledge expert was AUL2, who had been at the library for longer than most employees, who was referred to as "a veritable store house of knowledge", "the go-to for almost anything", and "an informational savior", and who was referred to positively by 8 of the interviewees. This positive sentiment was mirrored among those internal to the group who were seen as both knowledgeable and willing to share that knowledge. Further probing of Staff14 about his co-worker has him calling the person, "a life saver". These people are even occasionally seen as the lynchpin to team success, as observed by Staff9: "Our supervisor is an invaluable source of information. A lot of things would be problematic if he left." These instances make the connection between Resource Knowledge and coordination.

Summary of Resource Knowledge and its relationships with coordination. Implicit in the above is that Resource Knowledge allows for increased coordination. Libarian3 would be able to more quickly find the lender for the Chinese book, Staff4 would be able to get what was broken fixed, and the one of the reasons that the AUL2 and Librarian9 were so highly regarded is that they could get something answered or solved quickly, and thus get the employee moving forward. This increase in coordination is also noted by DeptHead3:

> I can handle basically the physical processing of most of the stuff that comes in, as well as *any* problems that come up. You know, a book shows up and we don't know what it is- it doesn't have any paperwork- I figure that out, but I also know that there are also three of the staff members that the majority of their job is to find books or articles that are more difficult to find, so anything that the software can't automatically find a lender for I know which one of them to go to. It allows me to move forward without worrying too much (DeptHead3)

The inverse can also be seen in the data, as several people noted that when key people do not have the requisite knowledge (or as will be noted below when they do not share that knowledge), it can lead to a decrease in coordination. AUL4 was discussing a joint report that needed to be created and that fell under the aegis of another AUL who was somewhat new. AUL4 stated:

> 'AUL' couldn't figure out how to do a joint report…And, then it just like struck me this week; there's already a joint report. 'DeptHead' already has a joint report…So, why did AUL say he couldn't figure out how to do it if we already have- oh,, well, it's one of these things. He'll figure it out eventually. That's okay. That doesn't really matter. We can always go back and change it.

This final comment that "we can always go back and change it" shows the need to do re-work, indicating that they were not highly coordinated. This is not due to a sense of not wanting to share, but rather of just not having the knowledge. This last quote indicates two further points; it offers support for Resource Knowledge as an outcome of coordination (through interaction Resource Knowledge is increased); and it speaks to the difference between having knowledge and being willing to share it.

It is argued that Resource Knowledge is gained in the process of coordination; as noted this is well supported in the data and in the examples above. AUL4 acknowledges that the AUL in question will "figure it out eventually" and both of the individuals seen as Resource Knowledge experts appear to have gained that knowledge through interaction -- AUL4 through time at the organization, and Librarian9 through the wide range of interactions. This is most clearly represented by a quote by Staff15: "the more you do the more you know."

More important, perhaps, than knowing who knows what it knowing who is willing to share that knowledge. This point somewhat overlaps with Relational Knowledge, but was mentioned explicitly 5 times as impacting Resource Knowledge, so it is important to address here at least in part. There were several instances of participants acknowledging that there were people that they knew had the information, but that they would not go to that person for answers. This appeared to be due to one of two reasons that are closely coupled: the person does not share information, or the person is not well liked. For instance, Staff7 indicated that he will avoid asking his supervisor for information as long as he can and offered the following example:

> Just last week I had an issue come up that I was unsure of, I asked co-workers, looked around the department for resources, I even got on the network drive and couldn't find the answer. Luckily, I went to lunch at the same time as 'the head of another department', who used to run my department and she knew the answer. (Staff7)

He had difficulty expressing exactly why he would not do so, just saying that he did not have a good working relationship with her. While this is an extreme example, other common comments included: "I don't know, they just don't seem to care", "I am not sure they really

know what they should know", "I am not sure they like me", "they have control issues", "I always feel like I interrupted her when I ask a question", and "why could I when there are people that want to help."

As can be seen from these comments, there is evidence that Resource Knowledge exists as either knowing what resources exist and how to attain them, or as knowing who has that knowledge, and that this knowledge seems to be associated with higher levels of coordination. This relationship was supported both in terms of poor knowledge leading to negative effects on coordination as well as the inverse -- higher levels of knowledge seeming to lead to increases in coordination. There is also evidence that much of the knowledge revolves around SOCM, including where information is stored and how to access it, thus offering some support for H11. Finally, the relationship with the organizational member who has the Resource Knowledge seems to be a vital component of coordination. This was somewhat unexpected and is more fully explored below.

Relational Knowledge. Relational Knowledge is argued to include being able to read and interpret those around you (interpreting non-verbal cues, recognizing political and network roles, etc)., as well as having an understanding of those around you (what are their needs, motivations, likely reactions, etc).. Key arguments were that Relational Knowledge functions to increase coordination through a) predicting the needs of organizational members in a situation, b) knowing how organizational members will react in a situation, as well as c) being able to read and properly interpret *in situ* interaction. Hypotheses included:

Hypothesis 12b: Uncertainty is positively associated with the use of Relational Knowledge.

Hypothesis 13: Relational Knowledge is positively associated with the extent of coordination.

H13 was strongly supported by Phase Two data in that increases in Relational Knowledge correlated with a substantial increase in interdepartmental coordination and a moderate increase in Intradepartmental Coordinating. (Additional results will be discussed below in Unexpected Results). The qualitative data was more varied in its support of the theoretical arguments, although in a general sense the data did support the model and H12b and H13 are discussed elsewhere.

Examining the theoretical arguments. This was perhaps the most difficult mechanism to explore through the qualitative data. To get people to talk about the ways they and others interact requires a higher level of trust than does exploring many of the other mechanisms. Much of the data that speaks to Relational Knowledge actually emerged from answers to questions not specifically targeting this mechanism. The assumed components of predicting the needs of organizational members, and being able to read and interpret *in situ* interaction were supported by some data, but neither was indicated enough individually to offer strong support. Knowing how organizational members will react, however, not only emerged as a major theme, but along with several other interactions noted above, it led to one of the primary unexpected themes explored below.

Knowing how organizational members will react as a mechanism that can affect coordination has already been referenced in some of the results above, including Librarian4's discussion of her new manager and them each finding their place; UnitHead4's example of getting comfortable with new employees; and most strongly in the examples of why people do not approach others (Resource Knowledge). Additional support comes from a variety of

sources in the library. This includes individuals from upper management when discussing why people go to them for advice on difficult issues:

> It is a lot of work. The advantage is, the majority of people know me, and I can be very honest…You know, so I try to talk to people, and depending on how stressed they are, I know how to talk to them. (AUL1)

A department head's example touches on using this knowledge to adjust interaction with people, "and she never, if she is completely overwhelmed, you will not know it. She is always charming. So, you need to double check that she is okay" (DeptHead3). At the unit level, there was this: "we know that we can go to anyone and they will do what they can to help, there isn't anyone that I would hesitate to ask" (Staff13). While these examples generally represent positive reflections and led to positive outcomes, there were also some that had a more negative tone.

Summary of Relational Knowledge and its relationship with coordination. Both positively and negatively framed responses supported the recursive nature of the relationship between Relational Knowledge and coordination, indicating that Relational Knowledge impacts coordination and that through coordination (interaction) this knowledge is (re)created. However, while the quantitative data supports a straightforward positive relationship between Relational Knowledge and coordination, the qualitative data paints a more complex picture. When Relational Knowledge exists and is positively framed (e.g., the relationship between the individuals is seen positively), generally the effect on coordination seems to be positive. This can be seen in the examples above: adjusting a response so as not to overly stress the recipient allows them to stay more focused; knowing that there may be underlying workload issues allows you to more clearly assess ability to complete a task; and

knowing when someone needs help allows for better decisions on assigning workloads. The opposite seems to be true about Relational Knowledge that is negatively framed (e.g., there is either a negative impression of the relationship, the other person, or of the expected reaction). This can manifest as an unwillingness to act:

> I know 'Supervisor' doesn't want to hear this, and, I haven't made the appointment yet because I've been a little neurotically worrying. Okay, is she going to say, "why haven't you talked to 'Immediate Supervisor' about this?" And I'm going to have to say, 'Immediate Supervisor' knows damn well about this." And everybody- it's just one of those things where everybody knows about this, but I don't know if anybody has said it to you yet. (Unidentified respondent to protect anonymity)

It also may indicate a resistance to feedback,

> I don't even know why we she does reviews. It's really kinda pointless…just going through the motions. It doesn't matter how hard you work, nothing will change, horrible employees get great reviews and she has nothing good to say about me. (Librarian1)

In both of these cases, as well as others, the perception of the other person affected action negatively in ways that would likely reduce coordination. The first is that a problem was not addressed that could hinder organizational success, and the second is that feedback designed to align work was disregarded.

However, a negative frame does not always lead to a negative impact on coordination. There were a number of examples of how knowing someone will not supply needed information, how knowing someone is unfriendly or uncooperative, or how recognizing that someone might not be a good member of a team, all led to decisions that

likely increased coordination if compared to what would have happened if that knowledge did not exist. Some of these are identifiable in examples represented elsewhere in the results, such as Librarian4 knowing his new boss was a bit unsure and so he gave him some space to learn, as well as offering support (which then led to a stronger relationship). Additionally, there were a number of times that respondents felt that, by recognizing who would and who would not be helpful, they could more quickly get to an answer.

It is in these last few examples that we can see the recursive nature of Relational Knowledge and support for the claim that Relational Knowledge mechanisms are (re)created in action. One of the stronger examples of this are the words of Librarian4: after he talked about his supervisor being unsure, and thus giving him some space and time to learn, he commented on their current relationship:

> I am so glad that I gave him the space and help to figure things out. Our relationship is really strong now, though there are still a few things that we clash on, we know what to expect from each other and it makes it easier to work together. (Librarian4)

This same theme emerged in several discussions of training new staff, such as:

> With new staff it always takes some time to get to know how to work with them. A few months in and I start to know what they are like, how best to talk to them, and what I can trust them with. They are all different. (Librarian10)

Finally, there were times where a team experienced change that exposed the recursive nature of Relational Knowledge. Five participants explicitly noted changes in the work environment that led to adjustment in Relational Knowledge. Some talked about the ebb and flow of student workers and adjusting to them, and one made an interesting remark that was supported implicitly in several other responses:

> When I am with a team I know, then if they are late or sick or whatever, even in busy times, I don't worry much about it, but when things change, then between co-workers, they get more nervous if someone is one minute late, or calls in sick, then it's big time. So, like, more than a couple new people, super busy times, like around finals week, stuff like that. And then it takes some time for everybody to get back to normal. (Staff4)

Three final notes on Relational Knowledge. The relationship between Relational Knowledge and coordination occurs both within the unit/department/divisional boundaries as well as cross-functionally. The cross-functional team mentioned above as having increased morale is a prime example of the ways that Relational Knowledge organizationally was seen as impacting coordination for the participants. This increase in morale can manifest to increase coordination through increased productivity, as well as a higher willingness to share information and to seek out information.

Most of the above frames relationships dyadically, and thus the perception of one person/relationship as impacting coordination. However, coordination is also facilitated (or hindered) by a multi-layered web of relationships. Even in what would appear to be simple actions there can be complexities. Upon further questioning, the individual above who was reluctant to speak to her supervisor's supervisor admitted that there was more to it than just thinking of the supervisor's supervisor. She also worried about her immediate supervisor's reaction and thought he might feel that she was disrespectful.

This last example also elucidates a final note on Relational Knowledge, which is that all of the above examples are from the perspective of the individual, and thus are speculative. It may be that the other person does not see an issue, that the issue is specific to the

respondent, that the participant is mistaken about the ways the other will respond. After talking first with her supervisor's supervisor and then with her immediate supervisor, this participant found that both were pleased with her action. Her boss told her that he was glad she took the initiative and that his boss was glad to get the feedback.

Routines

Routines align with the unconscious level of consciousness and are proposed to act to coordinate action based on relying on past action to guide behavior without thought. Routines include those times when we have internalized the behaviors to the point that we may not be able to easily articulate them. The relationships between routines and the other mechanisms are expected to be more intricate, as routines only can be created through interaction and they are expected to reduce the need to rely on the other mechanisms. The primary components, as identified in the model, include a) they are developed over time, b) they are generally unconscious, c) they can exist at multiple levels, d) they function by reducing the need for interaction, and e) they can emerge as negative routines that work against coordination. The hypotheses for routines is:

Hypothesis 14: Routines are established through consistent use of other mechanisms.

Phase Two analysis failed to find any significant support for either of the above Hypotheses. However, data that emerged from the qualitative phase of study speaks to the five theoretical arguments made in the presentation of the model, offers some support for the hypotheses, and suggests some unexpected results.

Examining the theoretical arguments. As with Knowledge Mechanisms, Routines were difficult to query specifically. The questions on the protocol that were specifically designed to elicit information on routines did so through first asking, "are there aspects of

your job that you once had to think about, but now just seem to happen without even thinking about them?". While this did open the door to some exploration through further probing, asking instead about ways that changes made them have to think or act more deliberately seemed to get people to more deeply discuss the ways that routines impacted their work. Additionally, there were a number of times that answers to other prompts revealed aspects of routines. This was, however, the least mentioned mechanism in the data, likely in part due to its nature as functioning unconsciously. In investigating the data to determine the ways that it aligned (or did not) with the proposed model, some interesting points emerged. First, there does seem to be some aspects of routines that operate differently at different levels of the organization (independent, team, interterm, organizational). Second, those routines function somewhat differently at the different levels. Third, and regardless of level, there is evidence for routines as being unconscious and created over the course of time. Fourth, there are routines that do not seem to function to reduce interaction (negative routines). Finally, there seems to be evidence for a key difference in how positive and negative routines are created.

The first two components -- routines are developed over time, and routines are unconscious -- were integrally linked and seemed to be central at every level. The simplest routines functioned to facilitate work that generally did not require interaction, but rather were independent tasks within the department – such as processing a new book, creating catalogue entries, and the like. For example, Librarian11 stated:

> About a year ago, it was cataloging in general, and now I can just do it do it do it, but now that we've started following these new rules, it's like I'm having to look things up. But I guess in the sense of when I look at a … for example, I used to really have to think about ok what do I need to include in the catalog record that's going to make

this findable, and now it's just sort of second nature to me of what I need to include, I just have to follow different rules on like how to actually put them in the record.

In the example above, Librarian11 notes that there are at least two of his general tasks that he does without truly thinking about them. He also observes that he developed those through time by doing them over and over again, but change disrupts that. These types of tasks were generally the ones that respondents initially identified when asked about routines. However, they also emerged in other areas of inquiry, including when following up with Staff7 about him not going to his supervisor and he said, "I have been doing this so long I really don't have to think much at all while I work, thankfully things I haven't done before don't happen often."

The last statement indicates that at times these independent level routines do actually eliminate the need for interaction, such as asking for help. Increased organizational level typically involves an increase in needed interdependency to complete tasks. It is routines at the team and interterm level that start to function to reduce interaction rather than completely eliminate it. Although there was not much data examining these levels, several people associated with Access Services gave some insight into routines at both the group level and at the intergroup level. Access Services is what the majority of students and faculty most commonly interact with; it includes things such as interlibrary loan, course reserves, stack services, and circulation. Each of these is its own unit, most with at least several employees and its own functions. The units also function in tandem in many ways, including sharing a space and often sharing student workers and other resources. At these levels, routines become much more complex since they include higher levels of interdependencies. One participant in Access Services noted the following:

> We had this all down for awhile, we all had designated shelves and areas that we knew and many of us had worked together for a bit. So, there was just a flow. We knew where we could walk without getting in the way, when we needed the course reserve for a class we knew where it was without having to ask around. It was smooth.

Here there is the evidence of routines occurring over time (worked together for a bit), being unconscious (there was just flow), and reducing interaction. Another member of Access Services mirrored this last point in stating, "we have been doing that for awhile, it is pretty easy now, rarely does anyone needs to ask anyone else a question."

There were even fewer references to routines that existed at the organizational level, and none that were explicit. However, there were still two comments indicating that the components may exist at the organizational level as well. In the first, DeptHead2 was discussing the training of student workers and said:

> Every year we have some carry over, but we know we are going to have a lot of new people as well and we have it down pretty well now. Even with the construction, new employees are brought in and trained without too many hiccups.

While she does not mention the reduction of interaction, it was implicit in her follow-up comment, "it takes so much less time to prepare for it." The other organizational routine was more referenced as a departmental one, but the rarity of the event and the level of complexity make it look more like an organizational routine. As with the previous example, this one emerged as the library managed seasonal increases in student and faculty need. Staff16 indicated:

> We've gotten – generally at the beginning and ends of quarters- we have a huge flood of books. At the beginning of quarters, everyone's trying to get their books for classes, and papers, and all that sort of thing. So, there's just more than we can handle. So, we just know, we don't have to tell everyone, it's all hands on deck and things just get done. (Staff16)

Routines (positive and negative) and coordination. Both positive and negative routines were expected, and they emerged from the data. Additionally, they both seemed to impact coordination as expected. What was less clear in the data was whether routines seemed to decrease access to Stored Organizational Coordinating Mechanism as predicted in H15a. Perhaps the most interesting outcome pertaining to routines is somewhat tied to H14, which states that routines are established through consistent use of other mechanisms.

Positive routines are those that at least in part operate to the benefit of the unit/department/organization and include much of the above. These certainly seem to increase coordination. Librarian11 was able to create a record that made access easier for others, Access Services functioned more effectively when positive routines were in place, and employees were onboarded more quickly. In each of these instances, the participants referred to specific other mechanisms that indicate a relationship between routines and mechanisms. Librarian11 planned his catalog records with ease of access in mind, Access Services created policies and procedures to align work and then gave consistent feedback in training staff, and the larger projects were set in place through meetings and conscious planning.

Only a few negative routines emerged from the data. One was identified by someone who had been with the library only about a year. He noted the following about his unit:

> So, all these [Unit] processes, as an example, they're really kinda weren't any when I first arrived. No, that's not true. There were, but they were all paper, and in retrospect all turned out to be *ad hoc*, and so there was just a way we always did things, and honestly, a lot of it was bad. (Staff2)

Staff6 referenced a similar experience: "there are just a lot of things being done that don't make sense, things have to get redone, things not getting done. I don't think anyone wrote the things we need to get done down." In each of these instances, what is missing is some attempt at aligning work in the first place, as well as a second-level process for identifying and resolving them. This suggests that a) negative routines may be linked to a lack of other mechanisms, inversely b) positive routines may be more likely when other mechanisms exist, and c) there is more support for the impact of routines on coordination.

These types of negative routines also emerge in the two departments that are more siloed. In each of these units, there seem to be some coordinating mechanisms in place, but more direct communication (CIM) is missing. In one, it had become common for employees to complete their own reviews and as a result there was almost no feedback to employees. In another, the negative routines centered around a lack of information on how to manage the adjustments to workflows, and work space configuration. In each of these the tools were supplied mostly as SOCM in the form of employee review sheets, instructions on their use, access to information by email, the wiki, and the website. However, in each case there was a lack of CIM. The leaders of both departments had a negative feeling about library leadership and so did not seek out information, and library leadership was unsure of how to get them more involved.

The indications here are that while routines exist at different levels of the organization, they function somewhat differently at the individual level than they do at higher levels. In part this is due to the lack of interdependencies, and thus a lesser need to interact with others at lower levels. Additionally, there seem to exist both negative and positive routines that can affect the level of coordination, although there are some apparent differences in how they are created. Negative routines seem to emerge when there is a lack of planning (SCM), a lack of reference or guide (SOCM) and/or feedback (CIM), and there are indications that CIM may be the larger contributor to creating positive routines.

Interaction of Coordinating Mechanisms

Throughout the findings above, there are some indications of the ways that the mechanisms interact. Phase Two analysis indicates that individually all but Routines correlate with both intra- as well as interdepartmental coordination SCM negatively. Additionally, when entered collectively in regression as independent variables the mechanisms account for 69% of intradepartmental coordination and 42% of interdepartmental coordination. However, when entered step-wise Relational Knowledge is the most impactful on intradepartmental coordination at 54% of the variance, with Resource Knowledge accounting for an additional 11% in step two. Interestingly for interdepartmental coordination it was Resource Knowledge that was the most impactful, accounting for 31% of the variance in step one and SOCM accounting for an additional 8% in step two. The possible reasons for the differences offer a strong discussion point to be explored below.

Some of this section is a summary of relationships as they are noted above as well as a brief further exploration of the results. Some of the expected and evidenced interactions from the above include the ways that SOCM interacts with CIM and Resource Knowledge, and the ways that routines interact with SOCM and CIM. However, these mechanisms don't

seem to always interact in ways that were explicitly identified in the presentation of the model.

Expected relationships. As noted above, many SOCM seem to be created as tools to be used in CIM, although that is not always the case. For example, some of the SOCM that exist in the library are more closely associated with SCM as noted below. Additionally, it was expected that access to SOCM was driven in large part by Resource Knowledge; this too was generally supported. Without knowledge that the resource (information as SOCM) exists or where it is, it is impossible to access. Finally, routines were expected to a) function by reducing the need for direct interaction (and thus CIM at least in part), b) reduce the reliance on SOCM, and c) be enabled in part due to Organizational Mechanisms. Not all of these were fully supported. It was found that for independent tasks that include little interaction to begin with routines were still established, but there was no interaction to impact. However, in larger contexts with more complex routines there was more reduction of interaction. There was no real evidence for or against the reduction of access to SOCM when routines are more highly relied on. Finally, it did seem from the data that the presence or lack of SCM (planning), SOCM, and CIM, affected whether routines emerged as negative or positive. While lack of SOCM was a factor, it seemed that CIM (specifically feedback) was the primary variable. Specifically, feedback could have realigned behavior towards the development of positive routines rather than negative.

Unexpected relationships. Many of the ways these variables interact, though not explicitly identified in the model, are obvious enough that they will only be briefly mentioned here. There are, however, a few that warrant a little closer look. As would be expected, Organizational Mechanisms naturally interact in myriad ways. Take, for example,

SCM such as plans, roles, special design, and budgets. It is through plans that roles are (re)established and space is designed; it is through budgets that rules of spending are created. There are some aspects or Organizational Mechanisms that even function as both SCM and SOCM, such as payroll systems that integrate scheduling (which functions to both enable and constrain work), as well as be a repository to draw for future coordination (payroll and budgeting). Additionally, there are some Organizational Mechanisms that function on all three levels, as in the calendar mentioned above. It functions as SCM that established rules of how you can and do align schedules; it functions as a CIM in its functionality as a communication tool to set up meetings and send information; and it functions as a SOCM as it stores information that can later be accessed by organizational members to align work. Additional interactions occur in instances such as, the role of the organizational member affecting the ways and amount of the use CIM, or the role of a supervisor requiring the person to use more CIM.

The data that emerged from the analysis of the Knowledge Mechanisms indicated that not only was Resource Knowledge associated with SOCM, but that Relational Knowledge played a part in accessing information as well. This manifested in a) the occasional reluctance to ask someone for information even if one knew they had it, and b) the occasional perception that someone would not give the information if asked. Both result in the same outcome; not gaining access to the resource. One of the commonly stated reasons for not accessing these resources referred to some aspect of the relationship. This relational component is the first of the major unexpected themes.

Unexpected Themes

All three of the unexpected, emergent themes can be conceptualized as relational. One looks at the valence of personal perspectives and the effect that can have on coordination. The second pertains to aspects of the relationship specific people, units, and departments have with the organization as a whole. The third refers to the relationship between librarian and non-librarian.

Personal perspective. Throughout these results there have been times that the interpersonal relationships involved impacted how effective or ineffective the attempt at coordination was. This was a major theme, and except for 2 people, every participant made some reference to an interpersonal relationship (either positive or negative) affecting coordination. Some comments were more extreme than others. At the extreme end of positive is the example above when a unit head noted that as a reaction to how noisy email was, she had integrated huddles into her team, even though she preferred email. This individual had several people speak highly of her, with one specifically noting the connection between the relationship and coordination, "she is great to work for, we all want to please her so [we] are much more likely to work extra or reach out to others on the team when we need help." Staff10. At the negative end is Staff7 (as quoted above): "I get not wanting to talk about it, but it really frustrates me, just talk to me so I can ask questions and get things right, right away." The direct result on coordination can be seen in the supervisor's words: "I have a hard time getting people to work sometimes, I mean they know what to do, but it doesn't seem like they want to do it." In each case it appears to be the relationship with the supervisor that is the primary influence on coordinating. Whether that is as a direct influence on coordination or as a moderating effect on the success of the other mechanisms will be further explored in Chapter 5. These interaction patterns appear to have more than just an

interpersonal effect, but also carry through to their team, and to the organization as a whole. The first team is consistently complimented in departmental and executive level meetings and is talked about well among staff who were observed. The other is seen as a "problem child" of a department, that has morale issues, and is heavily siloed. At an even grander scale these interpersonal issues can have long term effects. The most extreme was explained as being at the core of a split in the library that lasted almost 40 years. An AUL said when asked why one department was in an entirely different building and seemed to have its own culture, she replied:

> Well, it's because the 'that department' is another branch. But then there was … 'well how come I'm not on the same side of the house as' … we know it doesn't make sense, but 20 years ago there was a personality conflict and one division had to be moved away from the rest of the group. And that's all anybody can really guess at. Maybe it was 40 years ago. I don't really know.

Organizational perspective. These relational issues seem to bleed over into perceptions of the organization in ways that often align with these same departments. While there is not enough data to clearly show that having a negative manager creates a negative organizational attitude the data here certainly points in that direction. When an individual with a negative organizational outlook could be identified, it was common to find some others that worked under them had a similar outlook. This occurred at the department level and the unit level. This may be an artifact of the limited number of participants from those particular teams. But the opposite also seemed true, that a positive leader tended to have positive team members. This was not always the case though. This may be an artifact of

those with a positive outlook proactively recruiting the same for their teams. There is one example of this from someone that was a department head, but is now an AUL:

> Uh, when I first got here he was a department head and he was very, very welcoming to me. And, maybe calling him a mentor would be a little bit grandiose, but he was definitely a kind sympathetic ear and he was on the first floor. We were both on the first floor. So, there was this sorta, I didn't have to gain any altitude to go kvetch. So, it was, I already had a kinda established rapport with him. And I also sorta saw him operating with a bigger group. And I knew that he was a very- he's super proactive. And so, when I was asked "would you mind" I was like, sounds awesome to me.

Conversely, a UnitHead noted this as his experience:

> I had heard complaints from long term employees that it wasn't always fair, super top heavy with more and more in admin as opposed to getting raises, new admin was supposed to fix that, nothing has changed, I came here with the goal of getting promoted, but my boss won't do that for me and if I can't move up what is the point of reviews.

In each of the above, the effect on coordination is potentially substantial as it can affect willingness to put forth effort, to communicate, to work together, and even to decide whether to stay or not.

Librarian/Non-Librarian status. As noted in one of the early interviews, a theme emerged that pointed to a possible distinction in status between those who were designated as librarians and those that were not. This was then integrated into future protocols by adding probes to "what is your job title" that included "are you a librarian" and "what are the differences between librarian and non-librarian?". In retrospect, more explicit questioning

about this issue might have manifested a deeper understanding of this theme. As it stands now, there were a number of people who noted that there was a distinct differences in status between librarian and non-librarians. This came mostly from non-librarians, and at times was subtle with comments like “librarians just have more freedom”, and “they are looked to as more expert, even if it is an area they don’t know”, or “non-librarians seem to have to work harder for recognition”. Other non-librarians had much more extreme views, “they just look down on us and act like they can’t do wrong” and “as a non-librarian I am a second-class citizen around here”. All of these were from the perspective of non-librarians, but as noted not all non-librarians agreed or even noticed this proposed status difference, with comments like, “there really is no difference, it just matters what you got your degree in” and “I really don’t know”. The librarians who commented clearly did not agree, with only 6 observing some difference and 2 of them indicating that it was merely a mistaken perception on the part of the non-librarians. One librarian stated, “I have heard this before, but frankly I think it is ridiculous and all in their heads”. Another noted, “I guess I can see it, but I really can’t think of a time that I have seen a librarian treat a non-librarian any different than anyone else.”

An interesting additional point is that librarian/non-librarian is not an indication of educational level, but rather of specific focus. Several of the non-librarians had Masters Degrees, including one of the ones that viewed the status difference as the most extreme. Perhaps this is one reason they were more sensitive to being devalued.

Chapter Five

Discussion

This research primarily was intended to accomplish three objectives. The first is to bring some clarity to the study of organizational coordination through the development of a communicative model. The second is to use mixed methods research to check the veracity of the model and to measure some of the relationships. The third is to examine the findings from this research to inform the model specifically, and the study of organizational communication and coordination more broadly.

This discussion responds to this initial intent by moving through four layers of analysis. The first layer looks to the model itself and the implications the findings offer for the claims made. For each of the components of the model, this section briefly discusses the results that were expected and then moves into a discussion of unexpected results and the implications of those for the model. The second section offers the implications this research has for earlier organizational coordination theory, specifically the work of Okhuysen and Bechky. Moving more broadly from organizational coordination, the third section discusses how this work informs organizational communication theory, with particular attention to structuration theory, since it acted as the foundation for this work. The final layer looks to the future: first by examining the limitations and challenges offered by this study and how future studies might ameliorate them; and second by suggesting some future directions of research that this work implicates.

Model Confirmation

As noted above this section will only briefly discuss how the study confirmed the model. Instead, attention is given to the ways that the results either call into question the

hypotheses and assumption or indicate that adjustments need to be made to the conceptualizations presented. Those hypotheses that were not examined in the results section will not be discussed here (H2, H11, H14, H18a, and H18b). See Table 7 for a summary of Phase One results and Tables 3 and 4 for summaries of Phase Two results.

Moderating/mediating variables. The two expected moderating/mediating variables were uncertainty and interdependence. The principal argument made in the model was that the reduction of uncertainty is at the core of most attempts at coordination. This argument was well supported by earlier research, and by Phase One data. The ubiquity of uncertainty in the data makes it almost impossible to separate it from coordination. Uncertainty was referred to both implicitly and explicitly throughout the study. Implicit uncertainty can be seen in discussions of training (needing to increase knowledge and thus uncertainty as to what to do), planned change (the majority of the messages were designed to increase knowledge and thus again decrease uncertainty), and changes in staffing (not knowing how a person will interact).

The prevalence of uncertainty is heightened in organizations going through drastic change as this organization was. For many of these participants, nothing was certain. It was at these moments however where the perspective on change or uncertainty seemed to have an impact. Those that tolerated it well appeared to be able to coordinate more efficiently and those that didn't had a more difficult time. Though it was expected that uncertainty would interact with each of the variables, it was noted that the specifics of this interaction would be different for differing mechanisms. Phase Two data investigating this set of hypotheses shows this, but also confounds the ability to draw many definite conclusions. The hypotheses presented argued that uncertainty would be positively associated with SCM (H1a), CIM

(H4a), SOCM (H6a), Resource Knowledge (H9a), Relational Knowledge (H12a). However, the only significant relationships found were with SCM and Resource Knowledge. Results from Phase One indicate that uncertainty does belong in the model as an antecedent variable, but the specifics of how it functions need to be more fully developed. Additionally, as will be discussed more fully later, the member's perspective on the organization or on change in general needs to be a considered variable.

Interdependencies were also a consistent component of earlier work on coordination and the two key arguments for including interdependencies as an antecedent variable in the model were supported by Phase One data. However, Phase Two data offered some complexity to the analysis, as can be seen below. The first key argument was that coordination is, in essence, the aligning of interdependencies and thus interdependencies are intrinsic to coordination. Without interdependencies, there is nothing to coordinate and as interdependencies become more intricate the need for sophisticated collections of mechanisms seem to be required. The second argument, interdependencies are complex and impact differently based on the level of complexity also was supported, although there were some discussion-worthy findings.

The hypotheses proposed that intradepartmental and interdepartmental interdependencies had positive relationships with SCM (H1b), CIM (H4b), SOCM (H6b), Resource Knowledge (H9b), and Relational Knowledge (H12b). There were only three of these relationships that were significant. Intradepartmental interdependencies were positively associated with SCM. Interestingly interdepartmental interdependencies were negatively related to both CIM and SOCM, though the correlation was not very strong (-.19 and -.20 respectively). This lack of positive significant correlation calls into question the first

argument made above. The fact that interdependencies are at the center of coordination indicates, however, that there is some flaw in either the measures or in the way that Phase Two dealt with the interdependency variables.

The second argument speaks to the claim that earlier conceptualizations of interdependencies along lines like pooled, sequential, reciprocal, and team are too simplistic. Interdependencies emerged as multilayered and involving implicit and explicit connections that make it difficult even to identify all of the interdependencies, much less attempt to align a mechanism that will work "best with each." There were certainly some interdependencies that appeared as if they could be aligned in these ways. For example, the front desk might notice a damaged book, which then gets sent to be assessed for binding, the book then gets rebound and then put back into circulation. This interaction could certainly be described as sequential. However, even these seemingly simple relationships require much more complexity than the contingency models capture. Each of the handlers must interact with the library system software, they each have other tasks associated with other organizational members, and each has a supervisor and/or staff that might be involved. Rather than looking to the type of interdependency, it makes more sense to look at the level or intricacy of the interdependencies. Phase One data indicated that as level of interdependencies increased so too did the complexity of routines, the amount of CIM from leadership (about the construction), and the amount of resource knowledge (those that were more widely connected had higher levels of Resource Knowledge).

Organizational Coordinating Mechanisms. There were three arguments made about these mechanisms. The first was implicit: SCM, CIM, and SOCM are similar enough to be clustered under one heading. This first argument is better discussed after taking a closer

look at each of them individually. The second and third arguments were explicit and state that Organizational Mechanisms are more easily observed and more salient for participants. As noted above, these last two points were not only well supported in the data, but may have impacted the results in several layered ways. First, the observability and salience of these mechanisms increased the amount of data that was gathered by the researcher specific to these mechanisms, which led to a much larger data pool from which to mine evidence for emergent themes. Finally, this partly explains the depth of analysis on these mechanisms as opposed to the Knowledge Mechanisms and Routines as represented in the increased extent of analysis given to Organizational Mechanisms in Chapter Four. This increased attention is also due somewhat to the sheer number of distinct mechanisms that are classified as Organizational Mechanisms (e.g. projections, budgets, meetings, training, hierarchical structures, etc).. This increased space devoted to analysis should not be seen as an indication of the importance of this concept to the overall model, as will be made more apparent below.

Structural Coordinating Mechanisms (SCM). The results for SCM indicate some interesting things for the model, as well as draw out some implications for coordination more generally. The three primary claims in the model were that a) SCM are established through planning or interaction of the organizational members, b) planning can be both physical or non-physical (though observable), and c) as members interact in attempts at coordination these mechanisms are (re)created. Additionally, though H2 was not tested in Phase Two, Phase One data did offer some support for SCMs to be enacted through communication. The only hypothesis tested was H3: SCM are positively associated with the extent of coordination. Notably, the results were not as expected. SCM had a significant negative

relationship with both intradepartmental as well as interdepartmental coordination. The results for this will be more fully discussed below.

As noted, the key arguments explored in Phase One were generally supported. As expected, roles and rules such as specific and articulated chains of command, delineation of rights and responsibilities, and expectations as structures for aligning work were evident. The highly structured system in the Library aligns with its highly bureaucratic nature. The ways that these were accommodated to in interaction were interesting, however. The level of adherence to and recognition of these rules and roles hinged in part on the attitudes of the organizational members involved. Rules and procedures were talked about in three ways. Some felt that they were fine and thus in need of little attention. Some felt that they were in need of improvement but took responsibility for finding solutions. Finally, those that had a more negative organizational view than others saw issues as being outside their control. This last group seemed to either accept these issues as unavoidable or as something to rail against. These attitudes carried over to people's perception of leadership roles. Some recognized that a new leader would make mistakes and allowed for that, others took responsibility and assisted in the learning, and others saw poor leadership as something they had to deal with as a part of organizational life. Those who worked to accommodate to leaders by adapting to their formal roles, often took on informal leadership roles. These were generally mentioned positively, as when student workers trained new leaders in necessary, unfamiliar skills, or when members took some of the workload for leaders until they were "up to speed." The noted difference between Librarians and Non-librarians will be addressed below.

The effect of physical structures such as proxemics were seen to have the expected impact on increased coordination, but this relationship was more complex than indicated in

the model. Proximity seemed to function as a contributor to coordination such that being near lead to higher coordination due to increased feedback and ease of communication between organizational members. However, proximity alone was not the direct cause, but rather it was the increase in CIM and the ability for people to assume roles that were needed. This increase in CIM also had to be positive in nature. Those with poor relationships with their supervisors, or those with a negative organizational outlook, also noted more negative views of the structures that guided work.

The above mentioned negative responses to SCM offer some explanation for the negative correlation observed in the survey analysis. The measures for SCM only measured the presence of them, not whether they were positive or negative. In fact, as can be seen, the times they are most salient is when they have a negative impact on coordination. This last point is an indication that SCM are only effective if well managed. What that management looks like is a little more difficult to understand fully, but it seems to involve making sure that organizational members have a voice in plans and procedures, that moving staff takes into consideration the ways that they will interact with their supervisors and co-workers, and that informal roles to support formal roles should be encouraged. Additionally, as will be continually explored in the discussion of CIM and throughout the rest of this section, paying attention to building positive relationships is key to the management of coordinating mechanisms.

Conscious Interaction Mechanisms (CIM). Like SCM, the primary conceptualization of Conscious Interactive Mechanisms was supported by the data. Unlike SCM, the hypothesis that CIM was related to a greater extent of coordination was supported for both intradepartmental and interdepartmental coordination. The qualitative data for CIM,

however, offered some more nuanced commentary on the proposed model. In the presentation of CIM, the arguments were a) CIM was often intended to reduce uncertainty, and b) they included three modes: face-to-face, group, and mediated. Though all of the Organizational and Knowledge Mechanisms are hypothesized as being associated with uncertainty, CIM was explicitly posited to be consciously used with the intent of reducing uncertainty. These relationships were not as explicit in the data, however. Instead it emerged in discussion of times when uncertainty was high, and thus was supported implicitly. Many of the times that interaction was consciously brought to bear and discussed by participants surrounded things like training new employees, reacting to confusion from mediated communication, or managing relationships that were perceived as possibly difficult**.** In each of these situations, the uncertainty of the others' knowledge, understanding, or reaction was the primary driver for the use of CIM in attempting to achieve higher levels of coordination.

Three discussion points emerged from the data regarding modes of CIM. These include a more precise understanding of the expected modes, the emergence of an unexpected component of CIM, and the ways that these modes interact with each other and with the other mechanisms. Face-to-face, meetings, and mediated modes were expected to be brought to bear in attempt to align work and were commonly discussed by the participants. Results indicate that face-to-face is the method that is seen more positively by both those being supervised as well as those that are in supervisory positions, which is especially so for times when there is conflict or other more challenging or complex situations. The use of face-to-face modes, however, needs to be balanced against the increased time that dyadic interaction can take.

The perceived valence of group modes depended on several variables. If well managed and well executed, it seemed the most efficient for conveying larger more complex information to the general staff. Complex information also was offered commonly in larger meetings as well as through cascaded meetings down from top management to line staff. To manage this well, there needed to be a positive (or at least not negative) perception of high level leadership, as well as a positive relationship between manager and managed. I mention it here because it is vital to understanding the ways that CIM function, but this will be more fully explored below. Two additional points emerged from the data about meetings. The first is that there needs to be some balance between the benefit of meetings to coordinate work and the amount of time that meetings take employees away from actually working. Benefits noted included a clearer picture of what changes were occurring, stronger relationships across teams (when meetings were interdepartmental), and increased ability to accommodate the needs of other groups. Costs included decreased satisfaction and frustration with getting work done promptly

The data offered the greatest clarity concerning mediated modes of CIM. This clarity included not only improved recognition of the benefits and liabilities of mediated modes but also in furthering an understanding of the ways that people can utilize technologies as Conscious Interaction Mechanisms. One of the strongest practical implications of this research is that organizational leaders should be wary of email as a reliable way of conveying vital information. Email came up time and again as an unreliable or undesirable way to send or receive information, often as a result of the overuse of email as a communication tool. Several participants claimed that they did not pay close attention to email even though they knew that important information was there simply due to the overwhelming amount of

information that was sent by email. A primary addition to the conception of CIM included aligning work through mediated channels that were unexpected. These mediated channels include using the Oracle calendar not just to set meetings, but also to communicate to others about when to meet. Other technologies used in this way included the IT department's "The Help Desk" software, and the request management system among others. These secondary mediated modes sometimes even emerged as a result of frustration with the deluge of emails. One member specifically identified that as the reason they used Oracle rather than emailing the other person.

An important final note on CIM was the emergence of an unexpected mode (indirect one-to-one) that marry CIM, SCM, and SOCM in interesting ways. Supervisors and supervised noted that they do not always communicate directly as each of the above modes are argued. Rather they communicate indirectly (though still consciously) through the work. In some instances, this indirect communication occurred as work was checked at the end of the day and notes were left on the work or near the work to communicate where possible mistakes were made. In others, notes were left within a system asking questions or indicating the need for adjustment. This last was an additional way that Oracle was used to communicate, although more indirectly than asking if someone could meet. I observed an administrative assistant setting several meetings for people, but not necessarily asking them if they could meet. Instead, she was setting the time and then watching for acceptance or denial; if it was denied she would set another time. Though closely related to using Oracle as a direct-mediated communication tool, this was much more indirect. In each of the examples above participants are utilizing either SOCM, such as written notes or notes within work systems, or SCM, such as the calendar, to consciously communicate something specific

(CIM). These last unexpected outcomes do not call into question the model itself and do not indicate a need to add a sub-mechanism to Organizational Coordinating Mechanisms. They do however require that CIM itself be conceptualized slightly differently, including adding technologies like the Oracle Calendar to the conception of mediated modes of CIM and adding indirect one-to-one contact as a fourth mode (face-to-face, group, mediated, and indirect one-to-one).

Stored Organizational Coordinating Mechanisms (SOCM). As with CIM, the hypothesis (H7) was supported for both intra- and interdepartmental coordination, but there were some unexpected results from the qualitative data. The key arguments included that SOCM a) are often created as components of CIM, b) take some agency on the part of organizational members to access, and c) are only as useful as organizational members' willingness to access them. These arguments were supported, but the data indicates some slight adjustments need to be considered, including refinement of the definition, recognition of the differing types of SOCM, and how they are created and used.

The first concern from the results is the need to clarify the definition of SOCM. The definition presented was: SOCM are any artifact that is created by the organization that does not require direct interpersonal interaction in the facilitation of coordination, but exists for that reason. As the current definition stands, the indirect one-to-one CIM referenced above could be confused with SOCM although they are theoretically different. The primary difference is that SOCM are intended for long-term storage and to be referred to by more than just one recipient (usually). Indirect one-to-one CIM are meant to be read or noted within a short period and are generally directed at one (or at most several individuals). To avoid this confusion, moving forward SOCM are defined as organizationally created artifacts

intended for long term storage that do not require direct interpersonal interaction in the facilitation of coordination, but that still exist for that purpose.

The discussions on the differing types of SOCM, their creation, and their use are intricately linked. The initial conceptualization of SOCM identified several specific forms (e.g. training manuals, budgets, plans, etc), but did not clearly identify distinct typologies. However, Phase One data suggest there are several distinct types and that they function somewhat differently. Additionally, results indicated that the relationship between specific types of work and specific types of SOCM influenced the use of SOCM. There were three types of SOCM that were identified. These include a) SOCM that are vital to work, b) those that many use, but that are not integral to core work, and c) those that exist primarily as a reference.

SOCM that were vital for work are typically accessed more. Some of these were specific to certain units or departments like HR having to access employee records, or IT having to access the IT Help System. Others were much more broadly applied, like the library information system in which all the library records are stored (books, journals, who has checked them out, etc). which almost every unit accessed as part of their work. The second type includes SOCM that everyone needs to access but that were not necessarily vital to their work such as the payroll system to record hours, and Oracle to check schedules. These do not necessarily work to coordinate work within a department but do function to align disparate units towards organizational goals. The final type of SOCM include those that exist to align work, but that vary considerably in the extent to which they are accessed. These include those items that exist for conducting work (e.g. training manuals, procedures, checklists) as well as information that functions towards organizational level coordination,

but not necessarily work unit coordination (e.g. union contract information, travel expense reimbursement policies, etc). Access to the first two was obviously consistent and other than the adjustments in technology use that will be discussed below the integration of these into workflow as a coordination mechanism is evident. The last was more interesting in large part due to the variety of responses as to when and how they are accessed.

In general, stored SOCM like this third type are not often accessed for a variety of reasons including, just not thinking about them, being frustrated with the organization of them, or finding it easier just to ask someone in person. The times they were accessed more often included when relatively new to a task, when something unusual came up, or when training someone new on a task. In each of these examples, uncertainty is higher. Interestingly in each of these cases, CIM was a consistent part of the discussion. When being trained or when training, the manuals were often mentioned, but so too was the way it was used by the trainer in interaction. Though not as often a prime component of accessing information for rare occurrences, CIM was still mentioned when looking at travel reimbursement and union info as in both of these specific cases the information was prompted by a question from a direct report.

SOCM seem to be created at several points. Some of these emerge from work at the highest level of the organization and fall into two categories. The first are strictly information designed as a guide including things like annual budgets and strategic plans. The second are more structural in nature and are often more technological in nature like integrating a new employee recorded system or a new calendaring system into the organization. Other SOCM are created at lower levels of the organization and include things like training manuals to

guide both the supervisor and the supervised, or work schedules. Others are created more at the individual or unit level and include things like procedures and checklists.

Summary of Organizational Coordination Mechanisms. It is in the discussion of SOCM as created that the intricate relationships of the Organizational Coordination Mechanisms become apparent. In each of the above-referenced SOCMs, it is easy to see how SCM, CIM, and SOCM begin to interact. Organizational members are informed about strategic plans, budgets, and the integration and use of new technologies through CIM. These plans, budgets, and technologies then exist as SCM constraining and enabling interaction. Even as we look at lower levels, we see that training manuals are created and integrated through CIM, and the role of trainer is a component of SCM. Theoretically, they seem linked, and though difficult to parse empirically they are sufficiently distinct that we can note where one starts and the other begins. From the above, it would seem that, although there was some refinement needed in conceptualizations within the mechanisms, the overarching aspects of Organizational Mechanisms still makes sense as composed of SCM, CIM, and SOCM.

Knowledge Mechanisms. The primary arguments presented about Knowledge Mechanisms included a) they are more difficult to articulate being neither without thought nor entirely conscious and b) they are created through interaction. Though both of these were supported by the data they speak to the base of this theoretical model in structuration and as such will be more fully explored below. There were, however, some key discussion points that emerged from the data on both Resource Knowledge and Relational Knowledge.

Resource Knowledge. Within the data that referenced Resource Knowledge there was not only support for the arguments made in the presentation of the model, but also

particularly strong support for the relationship between Resource Knowledge and coordination (H10, see Table 3). Resource Knowledge's correlation with intradepartmental coordination was stronger than it was with interdepartmental coordination, which is interesting when compared to the step-wise regression analysis (See Table 4). When entered step-wise Resource Knowledge accounts for the majority of the variance in interdepartmental coordination at 54%, but with intradepartmental coordination, it is in step two and there only adds 11% of variance explained. Again, some of this might be an artifact of the number of cases, or it might be due to the influence from some of the unexpected variables noted like Personal or Supervisor Organizational Perspective

The primary arguments made were a) Resource Knowledge included knowledge about resources both internal and external to the group, b) resources included tangible as well as intangible facets, and c) Resource Knowledge is often associated with SOCM. Each of these was supported. As with the above mechanisms, however, the results provided a little insight into some of the nuances of the Resource Knowledge. One added nuance is that Resource Knowledge is multilayered at times including not just knowing where resources are, or who has needed knowledge or expertise, but also who knows where these resources are. And though this was not unexpected it often included a number of layers, as in knowing that someone knows who knows.

The data around who knows where resources are led to an added conception of Resource Knowledge that overlapped somewhat with Relational Knowledge. It was not enough to just know who knows, but that it was also important to know who would share that information. Additionally, those with knowledge, specifically those that shared it readily were held in particularly high regard. The relationship between Resource Knowledge and

Relational Knowledge somewhat blends here, which offers support for these belonging under the same umbrella. Additionally, this blending is seen in the quantitative results as these two together account for almost all of the variability in intradepartmental coordination. It appears that it is less important to have Resource Knowledge alone, specifically when dealing with who knows what. It is precisely at this point that also knowing who is willing to share becomes vital.

Relational Knowledge. Relational Knowledge and Resource Knowledge seem to interact in a variety of ways in. As evidence of this, some of the above lends support for the arguments made about Relational Knowledge. However, other evidence for the arguments was somewhat mixed. Key arguments were that Relational Knowledge functions to increase coordination through a) predicting the needs of organizational members in a situation, b) knowing how organizational members will react in a situation, as well as c) being able to read and accurately interpret in situ interaction. There were, however, some significant findings in response to H13 (Relational Knowledge is positively associated with the extent of coordination).

As with Resource Knowledge, Relational Knowledge was associated with both intra- as well as interdepartmental coordination. Interestingly, while Resource Knowledge had a stronger relationship with intradepartmental coordination ($r = .72$) than interdepartmental coordination ($r = .56$), Relational Knowledge had the opposite with an r of .73 with interdepartmental and an r of .43 with intradepartmental. Additionally, they reversed which of level of coordination they most impacted in regression analysis. Relational Knowledge had the highest impact in step one of regression analysis of intradepartmental coordination, accounting for 54% of the variance, but was excluded from interdepartmental coordination.

As noted in the Results section getting participants to fully engage in questions designed to elicit data about Relational Knowledge proved difficult which makes thoroughly assessing all of the claims difficult. There was not enough data to fully examine the arguments that Relational Knowledge includes predicting the needs of organizational members or being able to interpret in situ interaction accurately. The argument that knowing how organizational members will react can lead to better coordination is not only supported in the discussion of Resource Knowledge above but also well supported elsewhere in the data.

While knowing that someone might react negatively or positively certainly seemed to affect coordination, it was the general sense of positivity or negativity that had a broader impact at three points. First, at the individual level, people would not go to someone for resources if they thought the person would be unwilling to help. Second, at the unit or department level, the valence of an individual leader's outlook could affect the outlook of anyone that worked under them. Third, the valence of a person's outlook could influence the perception of them and their unit/department from those at higher levels of the organization. It was from this insight that the conceptualizations for Personal Organizational Perspective and Supervisor Organizational Perspective began to emerge. These will be more fully discussed below.

Routines. An important note about this discussion of routines: routines have a vast literature both as they pertain to coordination and independent from the study of coordination. It is beyond the scope of this work to examine routines writ large. However, findings, as they speak to routines in the context of arguments presented in the model, will be discussed. It was argued that routines a) are developed over time, b) are generally

unconscious, c) can exist at multiple levels, d) function by reducing the need for interaction, and e) can emerge as negative routines that work against coordination. There was support for most of these, though as with the other mechanisms there were some indications that conceptualizations needed to be adjusted slightly. Unfortunately, many of the proposed hypotheses for Routines were not investigated in this study and the tested relationship was not significant. This hypothesis looked at whether Routines were associated with extent of coordination.

Though the quantitative data offered little useful data about Routines, the qualitative data offered several keys to furthering our understanding of coordination. The first of these provides support for the conception of routines as functioning at varying levels (Feldman, 2000; Feldman & Pentland, 2003, Pentland &Reuter, 1994). The second looks at the mixed results in support of Routines functioning to reduce interaction. The third offers some insight into the ways that negative and positive routines may develop within the same organization.

Consistent with the work of Feldman and Pentland (Feldman, 2000; Feldman & Pentland, 2003; Pentland & Reuter, 1994), routines were seen to function at various levels in the organization. And although the amount of data does not offer significant insight into these levels, it does still inform some discussion. There were four levels of routines observed including the individual (independent) level, team level, inter-team level, and the organizational level. At each level, there were slight differences in the ways routines functioned. At the individual level routines included being able to enter book records without thinking about it, finishing the binding of a book, but not actually remembering doing it. They seem to develop through repetitive motion or action. At the team level, interdependencies get more complex and start to integrate components of Relational

Knowledge in that as people worked with each other interaction became less necessary. This reduction occurred due to an increase in understanding how they react as well as repetitive actions as in the individual level. At the inter-team level routines allowed for fewer questions of other organizational members and more reliance on expectations, Finally in the few instances of organizational routines the grammars of action noted by Pentland and Reuter (1994) include creating routines around our actual interaction. For the influx of student workers, every year library staff members have established routines of ramping up that involve routinized interaction. They interview more, train more, and so forth..

It is precisely the differences in the ways routines function at various levels that suggested an adjustment to the claim that routines operate to reduce interaction. They certainly do at the individual level and may continue to reduce interaction at the team level as people become more accustomed to each other. Once the inter-team level is reached though, some of the routines are actually created around interaction. For example one of the inter-team routines involved a cross-functional team that met monthly. They had developed routines for how the meetings would be conducted, who was responsible for what, and how they should follow up with each other. These are all centered on interaction rather than the reduction of it. At the highest level, the few routines that seemed to emerge were about how the library accommodates to the increased need of interaction due to the influx of new student workers.

The final emergent theme here informed the conceptions of negative and positive routines, specifically how they might be created differently. The fundamental difference in the emergence of negative versus positive routines seemed to be the presence of other coordinating mechanisms. Of particular importance appears to be CIM primarily and SCM

and SOCM secondarily. The importance of these mechanisms in creating positive routines was referenced by Staff6 when he noted that “I don’t think anyone wrote the things we need to get done down” -- which is a lack of SOCM. Staff2 recognized that even when there are SOCM, if they are not based on solid plans (SCM) there are still issues when she noted that all the processes that were written down “all turned out to be just ad hoc.” Finally, in each of these instances and others where negative routines had seemed to take hold, there was not a supervisor that was offering feedback to realign work away from negative routine.

Integrated model and unexpected results. Three unexpected themes emerged. The first two are somewhat related and have a significant impact on the proposed model, and the third speaks specifically to the study site. As mentioned throughout the Results and above in this Discussion chapter, the supervisor relationship was more important than anticipated. From the individual level, this manifested as the relationship with a particular supervisor or as the relationship with the organizational as a whole. From the department or unit level, it manifested as the relationship that the supervisor had with their team, their supervisor, or with the organization as a whole. This variable(s) could be stated as the valence of the relationship, the satisfaction of the individual or the supervisor, or attitude of the person. It was discussed in all of these ways, and across qualitative data it was consistently something that a) when it was negative seemed to have an adverse impact on coordination and b) when it was positive had a positive effect. The quantitative data firmly supports these implications in the power of Personal Organizational Perspective to account for variance in intradepartmental coordination. Though Supervisor Organizational Perspective was excluded from this intradepartmental regression, it did emerge as contributing to interdepartmental coordination.

The supervisors' organizational perspective seemed to have an impact beyond the individuals' perspective on coordination. It appears to have additional possible impact in two ways. When looking at those who worked under a leader who was seen as having a negative outlook (gathered from qualitative data), it appeared that the negative outlook offered adverse outcomes to anyone that worked under them. This negative outlook seemed to cascade down and offers something worth looking into further. Several departments had leaders with a negative outlook, and Phase One data indicated that those that worked under them tended to be unhappy. This relationship between supervisor perspective and supervised perspective was also true for positively aligned supervisors. This also seemed to lead to an organization view of the unit or department that aligned with the valence of the supervisor. If a unit had a leader that had a negative outlook, it was not uncommon for that unit to be brought up as a bad example by other participants.

These findings indicate several things for the model. First, the variables offered here -- or some other indicator or interpersonal relationships, satisfaction, or supervisory relationship – need to be integrated into the model as an antecedent variables (along with interdependencies and uncertainty). Second, when we conceptualize coordination, it is important to consider that it is not just tasks and resources that we are attempting to align; people and the strength of their relationships can have a significant impact.

Conclusion of model discussion. As can be seen, for the most part the model was well supported by Phase One data. Additionally, quantitative analysis supported the correlation of all variables with coordination, with the expectation of Routines. Where some adjustment was indicated, most were centered on the either slight reconceptualizations or adjustments. These included adjustments to conceptualizations of proxemics, mediated

modes of CIM, acknowledging a further complexity of Resource Knowledge, and recognizing that not all routines function to reduce interaction. More extensive realignments included adding indirect one-to-one as an additional CIM Mode, adjusting the definition of SOCM to clearly separate it from indirect one-to-one CIM, the delineation of three types of SOCM, and identifying the ways the positive and negative routines seem to emerge differently. Where arguments were not supported, it was usually less about finding contradictory evidence and instead on having a lack of evidence. These are areas that should be paid particular attention to in future research, including more information on how Relational Knowledge functions, more information on how Routines function, a closer look at the ways these variables interact, and addressing those hypotheses that were not investigated here (H2, H8a, H8b, H8c, H11, H14, H15a, H15b, H18a, and H18b). Finally, several things were not included in this model that most certainly need to be added, including conceptions of personal perspective and some measures of supervisor attitude.

Implications for Organizational Coordination

As initially noted in Chapter One coordination scholars have been investigating coordination for over 100 years and have creating wealth of scholarship, but that work had four key problematic issues: 1) much prior work lacks shared explicit conceptual or operational definitions, 2) types of coordination overlap and contradict each other, 3) coordination is often a secondary aspect rather than a central concern, and 4) coordination—as treated in the organizational literature—receives little attention by communication researchers. Though in working to resolve these issue this work has drawn from a wide range of sources it relied more specifically on three bodies of work. The first two to a lesser extent including the work of Malone and colleagues (Crowston, 1997; Crowston & Kammerer,

1998; Malone, 1987; Malone & Crowston, 1990; Malone and Crowston, 1994) and the review of organizational coordination literature by van Fenema, et al. (2004). The third source, work by Okhuysen and Beckhy (2009a), was relied on much more heavily in the conceptualization of this model. This study offers several implications to these foundational works.

The work by Malone and colleagues provides the base of much of what anyone who studies coordination begins. One is an understanding of what is being coordinated. As they worked to broaden the possible interdependencies, situations, and possible coordination mechanisms contingencies, they have allowed for a deeper understanding of just how complex coordination can be. The current investigation speaks to two of the common critiques of the contingency approach. First, this work demonstrated the difficulty in identifying all of the possible interdependencies and contextual situations that are needed to determine specific mechanisms that would work in any one situation. As noted in the findings, mechanisms are multilayered and intricately aligned – thus making it difficult to identify what particular mechanism is being used or having a specific effect. This first problem leads directly into the second: the intricacies of the mechanisms make it difficult to see specifically how they are accomplishing coordination. Additionally, this study calls into question the lack of agency that is common in the contingency approach. As noted, one of the most impactful variables included aspects of personal relationships.

The research of van Fenema et al. (2004) is more a taxonomy of coordination research approaches than an examination of coordination itself, but it offer arguments for the communicative nature of coordination and supplies the initial arguments for a structurational lens. As noted, it was the work of Okhuysen and Beckhy that contributed the most to the

development of this model. There were three primary ways that their research helped guide the development of this model and thus offers ways that this study informs theirs.

The first point at which their research impacted the model was the separation of mechanisms into five distinct types. They were certainly not the first to attempt a taxonomy of coordinative mechanisms, but by moving away from the vast collections of past researchers, they offered a more meaningful way of investigating their application to coordination. They identified five mechanisms: 1) plans and rules, 2) objects and representatives, 3) roles, 4) routines, and 5) proximity. Their second point was identification of three integrating conditions that these five mechanisms must accomplish to attain coordination: accountability, predictability, and common understanding. Finally, they suggest the importance of communication in the process of coordination, though not explicitly as part of their model.

In analyzing their work in the development of this model, there are three issues that this study ameliorates by taking a distinctly communicative perspective. First, there is conceptual overlap within the mechanisms. This overlap happens at the higher conceptual level of the mechanisms themselves as evidenced in the implicit part rules play in defining and enacting roles. It also happens within the described components of the mechanisms. One such example is the similarity between the subcomponent of routines, bringing groups together and visibility (which is a subcomponent of proximity). The second issue is the confounding of mechanisms and integrating functions. This confounding can be seen in their argument that that one of the ways accountability functions to coordinate action is through vertical authority. Vertical authority is clearly an aspect of roles, which Okhuysen and Beckhy argue are a mechanism that can be brought to bear to create coordination if

accountability exists. This ambiguity makes it difficult to identify what is a mechanism and what is an integrating function. Finally, there are some indications of other mechanisms within their descriptions of the integrating functions that are not included in their list of mechanisms. A primary example is knowledge, which is referenced in emergent means (a subcomponent of predictability that is described as familiarity with others' knowledge) and in common understanding (described as including task knowledge and knowledge of relevant members) but is not referenced as a coordinating mechanism.

The current model does this in part by utilizing the strength of communication theory in discussing complex interactive phenomena. Using structuration theory, it identifies two solutions to the issues mentioned above. First, it offers an argument for the clear separation of mechanisms brought to bear on coordination and coordination itself; structures (coordinating mechanisms) affect practice (coordination). This distinction led to the examination of these mechanisms and integrating functions to determine what is antecedent to coordination and what is coordination. The second conceptual power using structuration theory offered was a way to categorize the mechanisms in ways that clearly marked discernable differences between them. Each of the mechanisms in the work by Okhuysen and Bechky (both explicit and implicit) clearly aligned with the three levels of consciousness: the discursive (plans and rules, roles, objects and representations, and some aspects of proximity), the practical (knowledge about task, resources, and other organizational members), and the unconscious (routines). Although there are some distinctions within these categories, this overarching alignment makes distinctions more clear and offers a more parsimonious model for coordination.

When looking at the study of coordination more broadly, this work offers five significant benefits to the future study of coordination. First, it provided conceptual and operational definitions that a) make distinctions between coordinating, coordinating mechanisms, and coordination and b) allow for future testing of these concepts and their sub-components. Second, by reframing mechanisms within structurational levels of consciousness, this work offers a more parsimonious way for mechanisms proposed by others to be easily integrated into current research. Third, this work argued for and supported the notion that coordination is at the center of the process of coordinating as both influenced by and influencing the (re)creation of coordinating mechanisms. Fourth, it offers a rich theoretical vein that future researchers can mine (this will be more fully discussed below). And finally, it presents coordination as a distinctly communicative endeavor and supported this through not only the theory development but also the recognition of the power that relationships can have on coordinated efforts. This last contribution also will be more fully discussed in the next section.

Implications for Organizational Communication

The integration of communication as core to the study of organizational coordination was one of the primary objectives of this work. Essential to this was the use of structuration theory as the base upon which the model proposed and tested in this investigation was built. The following section will first discuss how this work informs structuration theory, specifically the three key points that were drawn upon in establishing this model. These include 1) the application of the four flows (particularly the third and fourth), 2) the duality of structure, and 3) the three levels of consciousness. Second, this section will present ways that this work furthers the study of organizational communication, including specific

opportunities for integrating this perspective into current areas of organizational communication research.

Structuration theory. The first way in which structuration theory informed this work relates to the argument made by McPhee and Zaug (2000) that there are four communication flows essential to the constitution of organization. These include 1) organizations typically draw a distinction between members and non-members communicatively (membership negotiation), 2) organizations reflexively self-structure through communicative processes, 3) organizations follow some manifest purpose which guides communication processes of activity coordination, and 4) organizations are embedded within larger contexts. The development of the model drew specifically from flow three and flow four above in establishing what is and is not coordination and in placing organizational coordination within a larger context. Results speak to each of the flows. Membership negotiation occurs at the organizational level as well as at the division, department, and unit level. This multi-level memberships negotiation was made clear in several interviews. Of particular note are conversations with those that worked in the Music Library which, while certainly part of the library in many ways, also attempted to separate itself. Workers in the Music Library communicated their individuality and enacted this through changes to procedures that other departments followed, and differences in policy. Interestingly, though, were those members that had come to accept or look forward to the eventual integration of the Music Library into the Main Library. These people talked more positively and seemed to more readily associate with the Main Library, although they also indicated their affiliation with the Music Library, suggesting that those organization contexts noted in the fourth flow can be multilayered.

Additionally, members may negotiate membership in several contextual layers at the same time as seen in the Music Library example.

The second key way that structuration impacted the development of this model was the duality of structure. The duality of structure concept was key in the conception of the mechanisms as not only impacting coordination but also in coordination (as action) (re)creating the mechanisms. A core proposition of structuration theory is that people draw on structural rules and resources in acting within a social system of practice and that through that system of action they (re)produce the very structures that guide them. Though the outcomes of coordination were not tested in this study, this duality of structure concept was well supported by the data. Structuration claims that the structures that are brought to bear in practice can be either perpetuated or transformed as outcomes of interaction. Interestingly, in this study whether those results were negative or positive seemed to have little to do with whether they were being perpetuated or transformed. There were several times where mechanisms (structures) were brought to bear on coordination (practice) and depending on a number of other variables those outcomes could be negative or positive.

One occasion of a positive transformation (at least as it affected later coordination) was the instance above where an inexperienced manager was brought into a team. Though, his formal role was established through interaction with his team his role (and theirs) was adjusted making future interactions stronger. An example of transformation leading to a negatively-viewed mechanism includes the network drive. The network drive shifted from an intended useful depository to a dumping ground where it is hard to find what you needed. If a mechanism was perpetuated, it retained it valence.

The third and most beneficial way in which structuration informed this model was the three levels of consciousness: conscious, discursive, and unconscious. Each of these aligned with one of the overarching mechanisms: Organizational Coordinating Mechanisms, Knowledge Mechanisms, and Routines respectively. For each of these, there was substantial support in the data for them to align as argued, as well as some interesting implications for understanding how they function differently.

The conscious level aligns with Organizational Coordination Mechanisms and are those mechanisms that are a) easily recognized and b) and more easily articulated. This alignment was represented in the ease with people discussed them and in the amount of data that was gained about them. In much of the observational data, the primary outcome was information on these mechanisms, including the data gathered from meetings. It was only through the interview process that the other mechanisms were more fully explored. Even though there are three distinct sub-components here, they all seemed to be easily recognized and appear to be recognized as being present to align work.

The discursive level aligns with Knowledge Mechanisms and are those mechanisms that are neither easily to articulate nor entirely unconscious. This alignment was also well supported, as evidenced by the increased difficulty in gathering data on knowledge. There was, however, some increased difficulty in gathering information on Relational Knowledge due in part to the greater need for trust to talk about relationships with others. This difficulty seemed particularly salient when the relationship was bad, but not awful. For several participants who seemed the most frustrated, they were only too ready to discuss the ways the other person negatively affected coordination. However, this does not relate specifically to how these mechanisms work in coordinating. What does offer more support is that

participants could readily talk about where they went for information, or when they asked for help, or when they knew someone was going to back them up, but they a) needed to be prompted to do so and b) did not always directly relate it to coordination. When asked about how a typical day, or how they knew what to do, they generally responded with aspects that related more to Organizational Coordinating Mechanisms. The exception was when asked about response to an unusual occurrence, or a disruption: it was not uncommon for them to note who they would go to for information or help. As a final note, if the unexpected theme of organizational perspective that emerged from the qualitative data is conceived of as a variable that affects coordination, it would seem to belong here at the discursive level.

Organizational communication more broadly. Beyond testing the proposed model, opportunities abound for utilizing this perspective on organizational communication in other areas of interest to communication scholars in general and organizational communication researchers in particular. These applications have the potential to advance, for example, Coordination as Energy-in-Conversation (CEC) theory, Coordinated Management of Meaning (CMM) theory, and the High Reliability Organizations (HRO) perspective. Each of these theories explicitly focuses on the importance, and nature, of coordination, communication, and meaning-making in organizations. Many other theoretical perspectives could be informed by the current theoretical model, including Speech Act Theories, Uncertainty Reduction Theory, Systems Theory, and Network Theories..

Coordination as energy-in-conversation (CEC). Quinn and Dunn (2005) develop a theory of coordination as energy-in-conversation. They identify conversations as the location of coordination in an organization and determine that conversations take energy, so the effort that people invest in a conversation towards coordination depends in part on the amount of

energy that they either gain or spend from those conversations. Quinn and Dunn conceive of energy as texts in that "a person can read his or her own energy as a bodily signal that summarizes how desirable he or she perceives the situation to be and that people can read another person's expressions to interpret how much energy that person feels" (p. 43). With this in mind, they identify energy in conversation as a person's energy level (representative of their situational desirability), the interpretation of the energy level of the other participant (represented nonverbally), and a feeling of wanting to act and being capable of acting, all of which leads to the level of effort the person will invest in the conversation and its subsequent coordinative results.

Two obvious aspects of this model of coordination and communication relevant to CEC are discursive consciousness (organizational mechanisms) and practical consciousness (knowledge mechanisms). Existing SCM such as rules, roles, and power structures affect possibilities for conversation and may inhibit or foster appropriate energy-in-conversation, influencing the extent and nature of coordination. In turn, the degree to which people have appropriate energy-in-conversation and share interpretations of that help to create Stored Organizational Coordinating Mechanisms and Conscious Interaction Mechanisms through interaction. The relational knowledge mechanism clearly would include organizational members' ability to interpret others' energy levels, as well as whether certain individuals will be accessible for and committed to coordination interaction.

Coordinated management of meaning (CMM). The premise of CMM is that in interaction people may not have the same intentions for interaction or understandings of how they are attempting to create meaning, but that as "persons-in-conversation" they create bonds of union that co-construct a reality (Pearce & Pearce, 1980, 2000) (whether that reality

is helpful or not). Salmon and Faris (2006) examined professionals from a child and adolescent mental health service as they met with other agencies to coordinate on cases. They utilized a CMM frame to understand the complexity of the discourse involved and discover an understanding or at least work towards a common goal.

CMM can serve a dual role in consideration of this model of coordination and communication. First, CMM can be conceptualized as one of the forms of in-situ interaction that constitute and enable coordination. For example, mismatched contextual levels or discourse assumptions during coordination interaction may create or reinforce subsequent unusual routines, such as treating certainty as uncertainty or vice versa. This has the effect of disfiguring Structural Coordinating Mechanisms, allowing (un)conscious interaction mechanisms, and inappropriately applying Stored Organizational Coordinating Mechanisms, in turn activating inappropriate responses to uncertainties (or masking or creating difficult-to-identify interdependencies), thus weakening or misdirecting Conscious Interaction Mechanisms efforts, and making subsequent successful coordination less likely. Hence, second, CMM itself is one kind of coordination activity (whether conscious or not) influenced by existing organizational and structural resources. Accessibility and relevance of structural coordinating mechanism relational knowledge resources would influence how participants coordinate and shape meaning during coordination.

High reliability organizations (HRO). Weick and Roberts (1993) offered a conception of the collective mind and heedful interrelating in a study of aircraft carrier flight deck crews. Typical construals of interdependencies and coordination did not seem to fit the context of these types of groups. The standard coordination literature examined groups that were concerned with productivity or efficiency but did not examine reliability (Weick &

Roberts, 1993). Groups such as deck flight crews, nuclear power plant operators, and shuttle crews have as their primary drive, not just a task but an incredibly precise task that requires highly reliable interactions or the consequences could be catastrophic (Weick, Sutcliffe, & Obstfeld, 1999). Weick and Roberts' (1993) examination of aircraft carrier flight crews and other high reliability organizations (HRO) unpacked these interactions. They determined that these groups utilize a different type of coordination that they identified as collective mindfulness. When a group of individuals working towards common goals enacts mindfulness, their individual interpretations and personal mindfulness combine into a collective mind that allows for a more precise awareness of situations and the environment (Weick & Roberts, 1993). Collective mindfulness includes five processes; a preoccupation with failure, a reluctance to simplify interpretations, sensitivity to operations, a commitment to resilience, and under-specification of structure (Weick, et al., 1999).

A preoccupation with failure is unusual, particularly for these types of organizations, because failure is so rarely seen. Alternatively, we may argue that it is exactly this preoccupation that generates and maintains a form of coordination that reduces the likelihood of failure. Possibility of failure is attended to in three ways in HROs. First, the expanded emphasis on failures increases the centrality of the maintenance departments of HROs as compared to other organizations, so that they become stronger and more salient Structural Coordinating Mechanisms. The maintenance department has contact with the highest number of failures and maintains a database for learning, increasing Stored Organizational Coordinating Mechanisms. Second, HROs encourage the reporting of errors, thus reflexively self-structuring by creating a routine as a resource knowledge mechanism. They note a study by Landau and Cristom (1995) that references a seaman on a nuclear aircraft carrier who

loses a tool on deck and reports it. This reporting results in all airborne aircraft being redirected to ground landings until the tool can be located and the commendation of the seaman for reporting it, rather than condemnation. Finally, this pre-occupation with failure leads to an attention to the failures inherent in continued success such as complacency, risk aversion, and inattention.

From this perspective, what may be considered as an undesired or unexpected organizational output (the identification and reporting of errors) becomes restructured, through aligning individual communication with HRO goals, and routinization, into a desired/expected output. What is typically seen as a source and form of uncertainty—error—is reconceptualized as a source of reducing future error by understanding interdependencies better. The crucial question here, then, is how both organizational mechanisms and knowledge mechanisms should be restructured to shape interactions and alignments within coordination to accomplish this transformation. For example, Weick, et al. (1999) show that HROs redefine coordination through layered systems of checks and balances, adversarial reviews, job re-training and rotation, structural redundancies, and diverse views on their teams. Another approach identified by Weick, et al. (2009) is attending to latent epistemic networks that only emerge when expected interdependencies are disrupted, or unwanted interdependencies are revealed, and then dissipate once the problem has been solved. Before routines are reconstituted, these typically unknown relational knowledge mechanisms should be understood and routinized into Conscious Interaction Mechanisms and Stored Organizational Coordinating Mechanisms.

Challenges and Limitations

The development and testing of this model offers much to those who study organizational coordination or organizational communication, but there were certainly some challenges and some limitations that should be addressed. These fell into three areas: those that emerged from the complexity of organizational coordination as phenomena, those that emerged from the study site, and those that were artifacts of the study itself.

As noted in Chapter One, organizational coordination is an incredibly complex phenomena to study. Even separating coordination as distinct from antecedent variables and outcomes proved difficult for many previous researchers. The presented model accommodated to most of the challenges presented by this complexity, but identifying all of the variables that impact coordination proved difficult. The emergence of personal and organizational perspectives is evidence of this. Even though the mixed methods approach accommodated this, there are likely other variables that need to be considered. Additionally, some of the variables that were expected are complex in and of themselves, such as interdependencies and uncertainty. This also emerged in the data analysis, as both of these items were challenging to test with statistical significance quantitatively.

The study site itself was chosen for several reasons. Primarily, it was seen as an excellent crucible to investigate coordination since it was undergoing so change. This change was multifaceted, including changes in roles, procedures, policies, and even drastic changes in physical space due to the construction project. One aspect of the intesity of organizational change was that it may confounded some of the variables. The second reason was a presumed bonus. The assumption of the researcher was that librarians would be more willing to participate in research due to their roles as supporting learning. Alhough this assumption seemed to have merit for some potential participants, it was countered by a

distrust or negative feeling towards upper management in several departments. For both Phase One and Phase Two, it was challenging getting participants. As part of the process of arranging interviews, an email was sent out from the University Libariran's office letting staff know about the study and letting them know they could participate during work hours. It also implied that the library leadership approved of the study and thus elicited a sense of distrust in some library employees. I had several participants mention that at least a few people were not participating as a result of dislike or distrust of management. For Phase Two, I specifically asked that wording be such that it did not seem to be from management, but there were still indications that some people distrusted the process. This lack of trust resulted in some issues with the data, some that had potential but unknown effects on the study and some that were quite impactful on the results.

As can be seen in Table 2, some departments were underrepresented and one was not represented at all in Phase One data. This missing data was even more pronounced in Phase Two, where one larger department was almost entirely unrepresented, and several others had very low response rates. One possible effect of this is that these voices might experience coordination quite differently from the rest of the target population and thus might alter the findings. Another possible effect is specific to the exploration of Phase One, in that there may have some other mechanisms or variables that did not emerge, but that still affect coordination. These are unknown effects, but these issues did have some obviously realized impacts, specifically on the quantitative analysis. The assumption that the library staff would readily engage in research was not only reason that this site was chosen, it was also why one of the potential challenges with the site was deemed unimportant. To gain statistical significance, this study needed almost all of the 137 employees to participate, but only 85

were included in the final analysis to a great part due to the low response rate. With only 85 final usable responses the intent to use CFA and SEM were eliminated and attaining significance in any relationship became more challenging.

The possible limitations that emerged from the study design certainly include the intent to use CFA and SEM. While these were, in part, accommodated through other statistical methods, there were still some other challenges that should be addressed. The first of these is an indication that some of the scales need to be refined, including the scales for SOCM ($\alpha = .60$), Relational Knowledge($\alpha = .61$), Uncertainty (($\alpha = .64$), and Routines (($\alpha = .60$). Additionally, as noted above, there is a need to reevaluate moderating and mediating variables to account for perceptions and perhaps to look at relationship quality. Finally, there were several hypotheses that needed to be tested, but as the instrument was also used for scale validation, it was already quite long, so the relevant variables could not be included to these those hypotheses.. Ideally, the scales would have been tested on a sub-set of the target population and then refined before administration to the rest of the participants. Pre-testing the scales would not only have strengthened them but also likely would have allowed some questions to be removed, making room for other queries without becoming burdensome to the participants. Unfortunately, though, as a consequence of the total population only being 137, it was decided not to do this.

Future Directions

The challenges above indicate the first fundamental area that future research needs to address. The first of these areas is the refinement and development of a more robust scale. Many of these measures were quite robust, and even those that did not attain high levels of reliability still suggest that many of the included items are useful. This scale refinement

should include not only additional work on the weaker measures but also the addition of other theoretically relevant measures. Some of these measures were indicated in this study like organizational perspective and status, while others may emerge from other researchers.

The second area that should be addressed is to further assess the model. This should be done by in two ways. First, future studies should use the refined survey from above and administer it to a much larger sample so that the relationships can be thoroughly examined. Second , the model should be tested in different organizational contexts. Though the library represents many aspects of complex organizations, gathering data from a variety of types of organizations would add weight to the claims made in the model.

The third area for future research would be integrated into the second and include three primary questions. One, how to do these mechanisms function communicatively (H2 and H15b)? Two, in what ways do the mechanisms interact (H11, H14, and H15a)? Finally, there should be studies focused on the outcomes of coordination (H8a, H8b, H8c, H18a, and H18b).

Once these fundamental concerns are addressed, there are many directions in which this line of research could go. These include a continuation of the expansion into different types of organizations, further exploration of other possible moderating and mediating variables, and investigations into positive and negative outcomes.

Conclusion

This work was intended to enrich our understanding of organizational coordination through the application of a communicative lens. In doing so, it not only opened up a rich area of possibilities for organizational communication research, but it also brings to the

forefront the importance of communication in the study of coordination. The use of structuration theory allowed for a conceptual model of coordination that is at the same time more parsimonious and more comprehensive than earlier treatments. This model creates a common grammar for the study of organizational coordination that bridges the vast disciplines that study it. The study itself furthered the applicability of structuration theory and strengthened our understanding of some of its major tenets. Finally, this work elucidated some areas in which the model needs to be adjusted, exposed some unexpected variables that seem to impact coordination, and offered directions for future researchers.

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Figure 1: *Proposed Model*

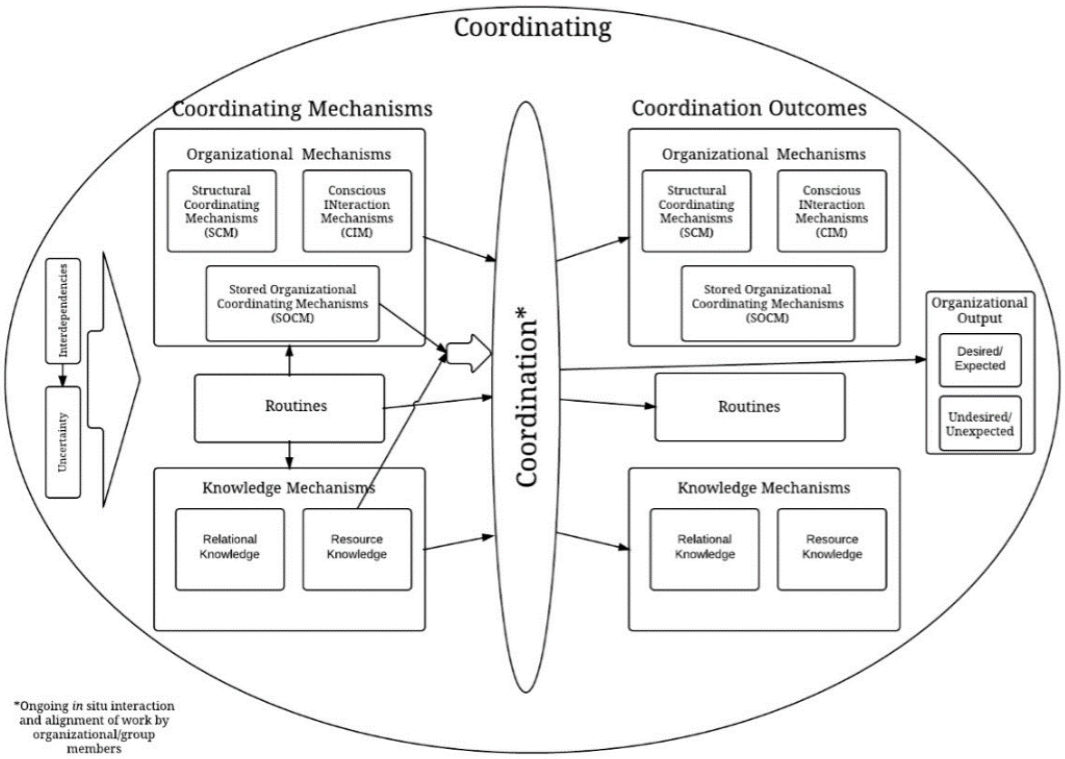

Table 1
Conceptual Definitions of Coordination

Definition and Source	Definition Attributes: Simple/complex Structure/process Accomplishment/ attempt
Coordination is a structure that is "a configuration of actors (individuals or groups of individuals—units in an organizational situation) who have interdependent responsibilities to create, modify and use an array of shared work objects" (Bailetti, Callahan, & McClusky, 1998, p. 238).	Simple Structure Accomplishment
“Coordination entails integrating or linking together different parts of an organization as they work together to accomplish organizational goals” (Bailetti, Calahan, & DiPietro, 1994, p. 2).	Simple Structure/Process Accomplishment
"Coordination means the activities of work participants are related to one another in certain mays, according to certain organizing principles" (Cheng, 1984, p. 832).	Simple Structure Attempt
“Coordination refers to the extent to which subtasks allocated to different positions need to be sequenced by definite precedence relationships” (O’Brien, 1968, p. 147).	Simple Structure/Process Attempt
“The integration or linking together of different parts of an organization to accomplish a collective set of tasks” (Van de ven, Delbecq, & Koenig, 1976, p. 322).	Simple Structure/Process Attempt
“Coordination can be defined as the collective accomplishment of individual goals through a cooperative process” (Ballard & Seibold, 2003, p. 401).	Simple Process Accomplishment
“Coordination in a group of agents concerns maximizing the joint surplus of their productive activities” (Foss & Lorenzen, 2009, p. 1203).	Simple Process Accomplishment
Coordination is “synchronization of interdependent tasks and schedules” (Hoegl, Weinkauf, & Gemuenden, 2004, p. 39).	Simple Process Accomplishment
“Coordination can be seen as a process of managing resources in an organized manner so that a higher degree of operational efficiency can be achieved for a given project” (Hossain, 2009, p. 25).	Simple Process Accomplishment
“Coordinating (is) the process by which teams attempt to manage interdependencies among individuals” (p. 2); “Coordination (is) the degree to which interdependencies are managed well” (Kraut, et al., 2005, p. 2).	Simple Process Accomplishment
“Coordination is managing dependencies between activities” (Malone & Crowston, 1994, p. 90).	Simple Process Accomplishment

"Coordination, the process of interaction (members implicit in interaction) that integrates a collective set of interdependent tasks, is a central purpose of the organization" (Okhuysen & Bechky, 2009a, p. 463).	Simple Process Accomplishment
Coordination is "the coming together of actions into a sequence or pattern, regardless of whether the producers of those actions agree on their meaning" (Salmon & Faris, 2006, pp. 285-286).	Simple Process Accomplishment
"The adoption of all members of a group of the same decision" (Simon, 1947, p. 8).	Simple Process Accomplishment
Coordination is "the act of working together harmoniously" (p. 358) and coordination is "the act of managing interdependencies between activities performed to achieve a goal" (Malone & Crowston, 1990, p. 361).	Simple Process Accomplishment/ Attempt
Coordination is "…the use of cooperative methods" and they "differentiated between those used by workers and administrators" (Alter, 1990, p. 483).	Simple Process Attempt
"Coordination involves adjusting the work of the group members to fit the goals of the group" (Cumming & Akari, 2005, p. 258).	Simple Process Attempt
"Coordination refers to the team-situated interactions aimed at managing resources and expertise dependencies" (Faraj & Xiao, 2006, p. 1555).	Simple Process Attempt
"Relational coordination is coordination—the management of task interdependencies—carried out in the context of relationships with other group members" (Gittel, 2001, p. 471).	Simple Process Attempt
Coordination is "the conscious activity of assembling and synchronizing differentiated work efforts so that they function harmoniously in the attainment of organizational objectives" (Young, et al., 1998, p. 1215).	Simple Process Attempt
"The extent to which the work activities of organizational members are logically consistent and coherent…in role-system terms, coordination represents how well the organizational members as a whole perform in accordance with their roles in the system" (Cheng, 1983, pp. 156-157).	Complex Process Accomplishment
Temporal coordination is "an activity with the objective to ensure that the distributed actions realizing a collaborative activity takes place at an appropriate time, both in relation to that activity's other actions and in relation to other relevant sets of neighboring activities" (Badram, 2000, p. 163).	Complex Process Attempt
"At its core coordination is about the integration of organizational work under conditions of task interdependencies and uncertainty" …. "Coordination is a temporally unfolding and contextualized process of input regulation and interaction articulation to realize collective performance" (Faraj & Sproul, 2000, p. 1157).	Complex Process Attempt

“Coordination in work teams is an emergent phenomenon involving the use of strategies and behavior patterns aimed at integrating and aligning the actions, knowledge, and objectives of interdependent members, with a view to attaining some common ground” (Rico, Sanchez-Manzanares, Gil, & Gibson, 2008, p. 163).	Complex Process Attempt

Table 2

DesiredPhase One Representation Chart

Division	Unit	Total Number of Possible Participants	Contacted	Desired Number of Respondents	Actual Number of Respondents
Representation by Organizational Level		137	129	63	46
	Staff/Librarian	112	104	43	31
	Unit Head	12	12	7	5
	Dept Head	6	6	6	5
	Special Proj.	1	1	1	1
	AUL	6	6	6	4
Access Services		22	22	9	4
	Circulation Services	10	10	3	1
	Course Reserves	1	1	1	1
	Interlibrary Loan	6	6	2	2
	Stack and Copy Services	4	4	1	0
ARMS		20	20	7	5
	Conservation	3	3	1	1
	Monograph Receiving	3	3	2	1
	Monograph Ordering	2	2	1	1
	Serials Ordering	4	4	1	1
	Serials receiving	2	2	1	0
	Accounting	2	2	1	0
	Other	3	3	1	0

Administration		13	9	5	6
	Human Resources	3	3	1	2
	Development	2	1	1	1
	Building Operations	2	1	1	1
	Other	6	4	1	1
		10	7	4	5
		3	2	1	1
Reference Services		15	15	5	4
	Collection Specialists	6	6	2	2
	Other Reference Staff	9	9	3	2
Each of the below do not have distinctly different job descriptions					
Area Studies		3	2	1	1
Cataloging and Metadata Services		12	12	4	3
Collection Services		5	5	3	5
Library Information Technology		8	8	4	2
Map and Imagery Laboratory (MIL)		4	4	2	2
Music Library		8	6	3	3
Outreach and Academic Collaboration		5	4	3	4
Research and Scholar Services		3	3	3	3
Special Research Collections		16	16	4	4
“Unnamed Author” Collection*		3	3	1	0

**name removed to avoid identification of specific library*

Table 3
Scale Validation Details

Scale Name	Original Item	Final Items	Cronbach's Alpha	Mean	Standard Deviation
intradepartmental coordination	10	10	.95	4.30	1.16
Interdepartmental Coordination	6	6	.90	4.31	1.42
Structural Coordinating Mechanisms	8	8	.68	3.19	1.29
Conscious Interaction Mechanisms	8	8	.74	4.08	.95
Stored Organizational Coordinating Mechanisms	6	5	.60	3.99	.098
Resource Knowledge	6	6	.84	4.37	1.22
Relational Knowledge	4	3	.61	5.29	1.05
Routines	4	2	.65	3.14	.98
Uncertainty	9	4	.64	4.68	.99
Intradepartmental Interdependencies	7	7	.80	4.15	.98
interdepartmental interdependencies	6	6	.74	3.71	1.05
Personal Organizational Perspective	3	3	.91	5.17	1.49
Supervisor Organizational Perspective	2	2	.78	5.44	1.42

Table 4

Pearson's Correlations for Tested Hypotheses

Note: Uncertainty measures in column in the first column represent the results for the proposed relationship.

	*Intra*departmental Interdependencies / Coordination		*Inter*departmental Interdependencies / Coordination	
	Correlation	Sig.	Correlation	Sig.
Hypothesis 1a: Uncertainty is positively associated with use of structural coordinating mechanisms (SCM).	0.276	0.005		
Hypothesis 1b: Interdependencies are positively associated with the use of SCM.	0.341	0.001	0.087	0.213
Hypothesis 3: SCM are positively associated with the extent of coordination.	-0.390	0.000	-0.381	0.000
Hypothesis 4a: Uncertainty is positively associated with use of conscious interaction mechanisms (CIM).	0.163	0.068		
Hypothesis 4b: Interdependencies are positively associated with the use of CIM.	0.151	0.083	-0.194	0.038
Hypothesis 5: CIM are positively associated with the extent of coordination.	0.442	0.000	0.494	0.000
Hypothesis 6a: Uncertainty is positively associated with use of stored organizational coordinating mechanisms (SOCM).	0.055	0.309		
Hypothesis 6b: Interdependencies are positively associated with the use of SOCM.	0.071	0.259	-0.195	0.037

Hypothesis 7: SOCM are positively associated with the extent of coordination.	.424	.000	.336	.001
Hypothesis 9a: Uncertainty is positively associated with the use of Resource Knowledge.	0.208	0.030		
Hypothesis 9b: Interdependencies are positively associated with the use of Resource Knowledge.	-0.018	0.435	0.094	0.196
Hypothesis 10: Resource knowledge is positively associated with the extent of coordination.	0.722	0.000	0.557	0.000
Hypothesis 12a: Uncertainty is positively associated with the use of Relational Knowledge.	0.038	0.363		
Hypothesis 12b: Interdependencies are positively associated with the use of Relational Knowledge.	-0.090	0.206	-0.990	0.183
Hypothesis 13: Relational knowledge is positively associated with the extent of coordination.	0.432	0.000	0.731	0.000
Hypothesis 17: Routines are positively associated with the extent of coordination.	-0.042	0.353	-0.009	0.467

Table 5

Regression Tables for Impact of Mechanisms on intra- and Interdepartmental Coordination

Intradepartmental Coordination

Forced Entry Model	R	R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.83	.69	.84	.69	28.22	6	78	.000

Forced Entry	B	Beta	t	Sig.
(Constant)	-1.53		-1.87	.065
SCM	.05	.47	.62	.535
CIM	.19	.12	1.50	.138
SOCM	.12	.08	1.14	.257
Resource Knowledge	.44	.38	4.28	.000
Relational Knowledge	.64	.47	5.49	.000
Routines	-.08	-.60	-.82	.414

Stepwise Model	R	R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1- Relational Knowledge	.73	.54	.98	.54	95.48	1	83	.000
2- Resource Knowledge	.81	.65	.85	.12	29.38	1	82	.000

Step One	B	Beta	t	Sig.
(Constant)	-.35		-.64	.521
Relational Knowledge	.996	.73	9.77	.000
Step Two	B	Beta	t	Sig.
(Constant)	-.68		-1.43	.157
Relational Knowledge	.63	.46	5.71	.000
Resource Knowledge	.52	.44	5.42	.000

interdepartmental coordination

Model	R	R Square	Std Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.65	.42	.92	.42	9.57	6	78	.000

Forced Entry	B	Beta	t	Sig.
(Constant)	1.34		1.49	.141
SCM	-.13	-.14	-1.37	.174
CIM	.16	.13	1.17	.246
SOCM	.28	.24	2.38	.020
Resource Knowledge	.31	.32	2.7	.009
Relational Knowledge	.09	.08	.67	.502
Routines	-.06	-.05	-.53	.596

Stepwise Model	R	R Square	Std Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1- Resource Knowledge	.56	.31	.97	.31	37.347	1	83	.000
2- SOCM	.62	.39	.92	.08	10.261	1	82	.002

Step One	B	Beta	t	Sig.
(Constant)	1.99		5.05	.000
Resource Knowledge	.53	.56	6.11	.000
Step Two	B	Beta	t	Sig.
(Constant)	.965		1.965	.053
Resource Knowledge	.45	.48	5.26	.000
SOCM	.34	.29	3.2	.002

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Table 6

Pearson's Correlations for Perceptions of the Workplace

	SCM	CIM	SOCM	Relat. Know.	Res. Know.	Routines	Intradept Coord.	Interdept. Coord
Personal Perception of Workplace	-.28	.41	.34	.55	.47	.11	.60	.57
Significance	.009	.000	.001	.000	.000	.310	.000	.000
Supervisor Perception of Workplace	-.31	.32	.13	.60	.57	-.17	.51	.58
Significance	.004	.003	.230	.000	.000	.877	.000	.000

Table 7

Regression Tables for Impact of Mechanisms on intra- and Interdepartmental Coordination with the Inclusion of Personal Organizational Perspective and Supervisor Organizational Perspective

intradepartmental coordination

Stepwise Model	R	R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1- Relational Knowledge	.73	.54	.98	.54	95.48	1	83	.000
2- Resource Knowledge	.81	.66	.85	.12	29.38	1	82	.000
3- Supervisor Org. Perspective	.83	.69	.82	.03	7.26	1	81	.009

Step One	B	Beta	t	Sig.
(Constant)	-.35		-.64	.521
Relational Knowledge	.996	.73	9.77	.000
Step Two	B	Beta	t	Sig.
(Constant)	-.68		-1.43	.157
Relational Knowledge	.63	.46	5.71	.000
Resource Knowledge	.52	.44	5.42	.000
Step Three	B	Beta	t	Sig.
(Constant)	-.89		-1.91	.060
Relational Knowledge	.51	.38	4.46	.000
Resource Knowledge	.43	.37	4.39	.000
Super. Org. Persp.	.22	.22	2.70	.009

interdepartmental coordination

Stepwise Model	R	R Square	Std Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change

1. Personal Org. Persp.	.57	.32	.97	.32	39.13	1	83	.000
2- Resource Knowledge	.67	.41	.91	.09	12.14	1	82	.001
3- SOCM	.67	.45	.88	.04	6.54	1	81	.012

Step One	B	Beta	t	Sig.
(Constant)	2.02		5.33	.000
Personal Org. Persp.	.44	.57	6.26	.000
Step Two	B	Beta	t	Sig.
(Constant)	1.33	.41		.002
Personal Org. Persp.	.29	.37	3.68	.000
Resource Knowledge	.37	.35	3.48	.001
Step Three	B	Beta	t	Sig.
(Constant)	.64		1.33	.186
Personal Org. Persp.	.24	.31	3.10	.003
Resource Knowledge	.31	.32	3.52	.002
SOCM	.27	.23	2.56	.012

Table 8

Librarian versus Non-Librarian Perceptions t-test Results

	Librarians		Non-Librarian			
I Think…	M	SD	M	SD	t-test	p-value
There is a status difference between Librarians and Non-Librarians	4.35	1.60	5.19	1.70	-2.310	0.024
Librarians think they have a higher status	5.03	1.46	5.54	1.47	-1.600	0.11
Non-Librarians think that Librarians have a higher status	5.46	1.17	5.33	1.67	0.392	0.7

Table 9

Results from Phase One Data

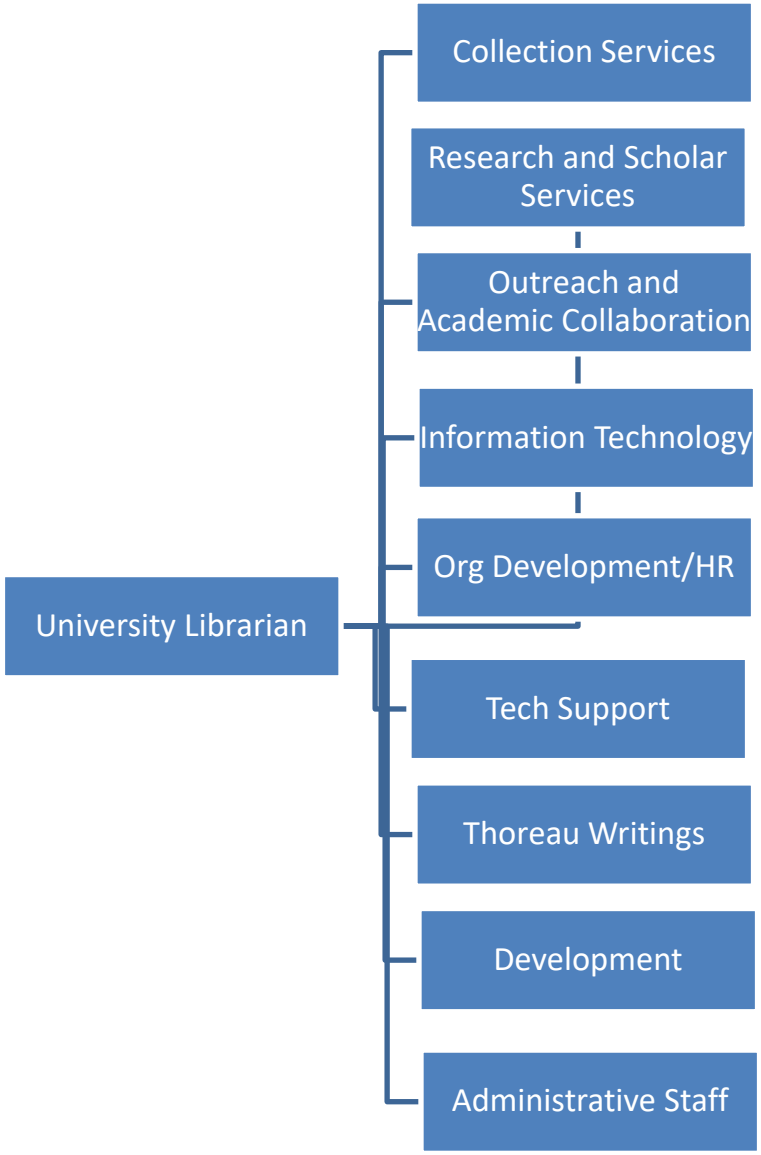
Claim	Level of Specificity	Expected/ Unexpected/ Both	Supported/Not Support/Not Enough Data
The reduction of uncertainty is at the core of most attempts at coordination	Antecedent Variable	Expected	Supported
Interdependencies are what is being aligned in coordination	Antecedent Variable	Expected	Supported
Interdependencies are complex and impact differently based on level of complexity	Antecedent Variable	Expected	Supported
SCM, CIM, and SOCM can be clustered under the overarching term Organizational Coordinating Mechanisms	General Mechanism	Expected	Supported
Organizational Mechanisms are easier to observe than the other mechanisms	General Mechanism	Expected	Supported
Organizational Mechanisms are more salient to organizational members than other mechanisms	Primary Mechanism	Expected	Supported
SCM can be established through planning	Primary Mechanism	Expected	Supported
Planning can be physical or non-physical	Primary Mechanism	Expected	Supported
SCM can be (re)established through interaction	Component Mechanisms	Expected	Supported
SCM as enacted through communication	Primary Mechanism	Expected	Supported
CIM is often intended to reduce uncertainty	Primary Mechanism	Expected	Supported
CIM can be accomplished through face-to-face communication	Primary Mechanism	Expected	Supported
CIM can be accomplished through group communication	Primary Mechanism	Expected	Supported
CIM can be accomplished through mediated methods	Primary Mechanism	Both	Supported

*CIM can be accomplished using indirect one-on-one communication	Primary Mechanism	Unexpected	Supported
*SOCM definition adjusted to: organizationally created artifacts intended for long term storage that do not require direct interpersonal interaction in the facilitation of coordination, but that still exist for that purpose	Primary Mechanism	Unexpected	Supported
*SOCM are often created as a component of CIM	Interaction of Mechanisms	Both	Supported
SOCM take agency on the part of the organizational member to access	Primary Mechanism	Expected	Supported
SOCM are only useful if organizational members access them (Resource Knowledge)	Interaction of Mechanisms	Expected	Supported
*There are three types of SOCM: those that are integral to task completion, those that many use, but that are not integral to core work, and those that exist for reference only	Primary Mechanism	Unexpected	Supported
Knowledge Mechanisms are created through interaction	General Mechanism	Expected	Supported
Knowledge Mechanisms are neither without thought nor completely conscious	General Mechanism	Expected	Supported
Knowledge Mechanisms are difficult to articulate	General Mechanism	Expected	Supported
Resource Knowledge exists as both internal and external	Primary Mechanism	Expected	Supported
*Those with high levels of Resource Knowledge that were willing to share that knowledge are granted high status	Primary Mechanism	Unexpected	Supported
Relational Knowledge functions to increase coordination through predicting the needs of others	Primary Mechanism	Expected	Not Enough Data
Relational Knowledge functions to increase coordination through knowing who others will react in a situation	Primary Mechanism	Expected	Supported

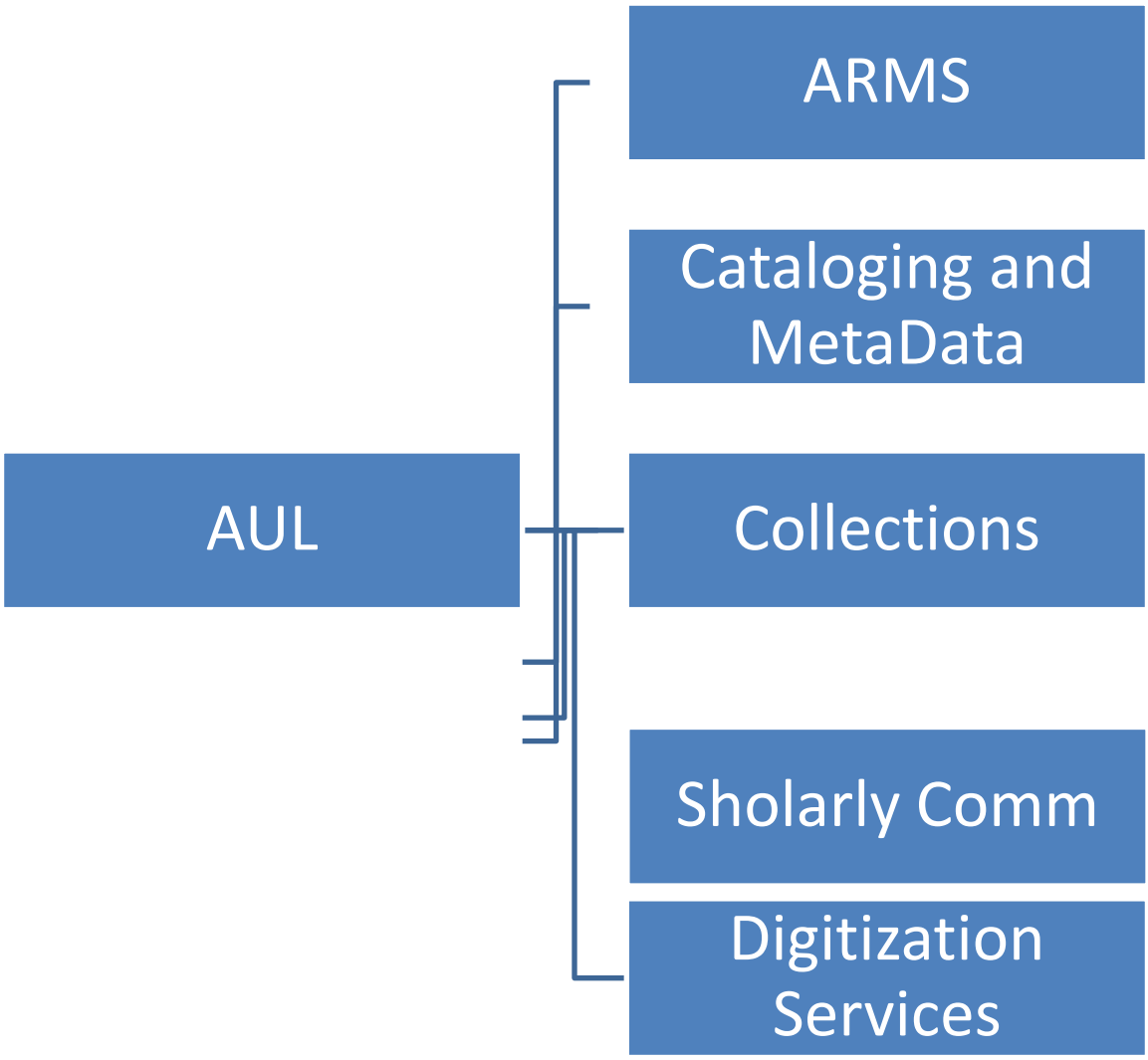
Relational Knowledge functions to increase coordination by being able to read and interpret others *in situ*	Primary Mechanism	Expected	Not Enough Data
Routines are created over time	Primary Mechanism	Expected	Supported
Routines are generally unconscious	Primary Mechanism	Expected	Supported
*Routines exist at multiple levels	Primary Mechanism	Both	Supported
Routines function to reduce interaction	Primary Mechanism	Expected	Supported in part
Routines can emerge as negative routines that work against coordination	Primary Mechanism	Expected	Supported
*Negative routines and positive routines are created differently	Primary Mechanism	Unexpected	Supported
*The creation on Routines are enabled through the use of other coordinating mechanisms	Interaction of Mechanisms	Both	Supported
*Relational Knowledge impacts the accessing of SOCM	Interaction of Mechanisms	Both	Supported

**designates an unexpected outcome was identified*

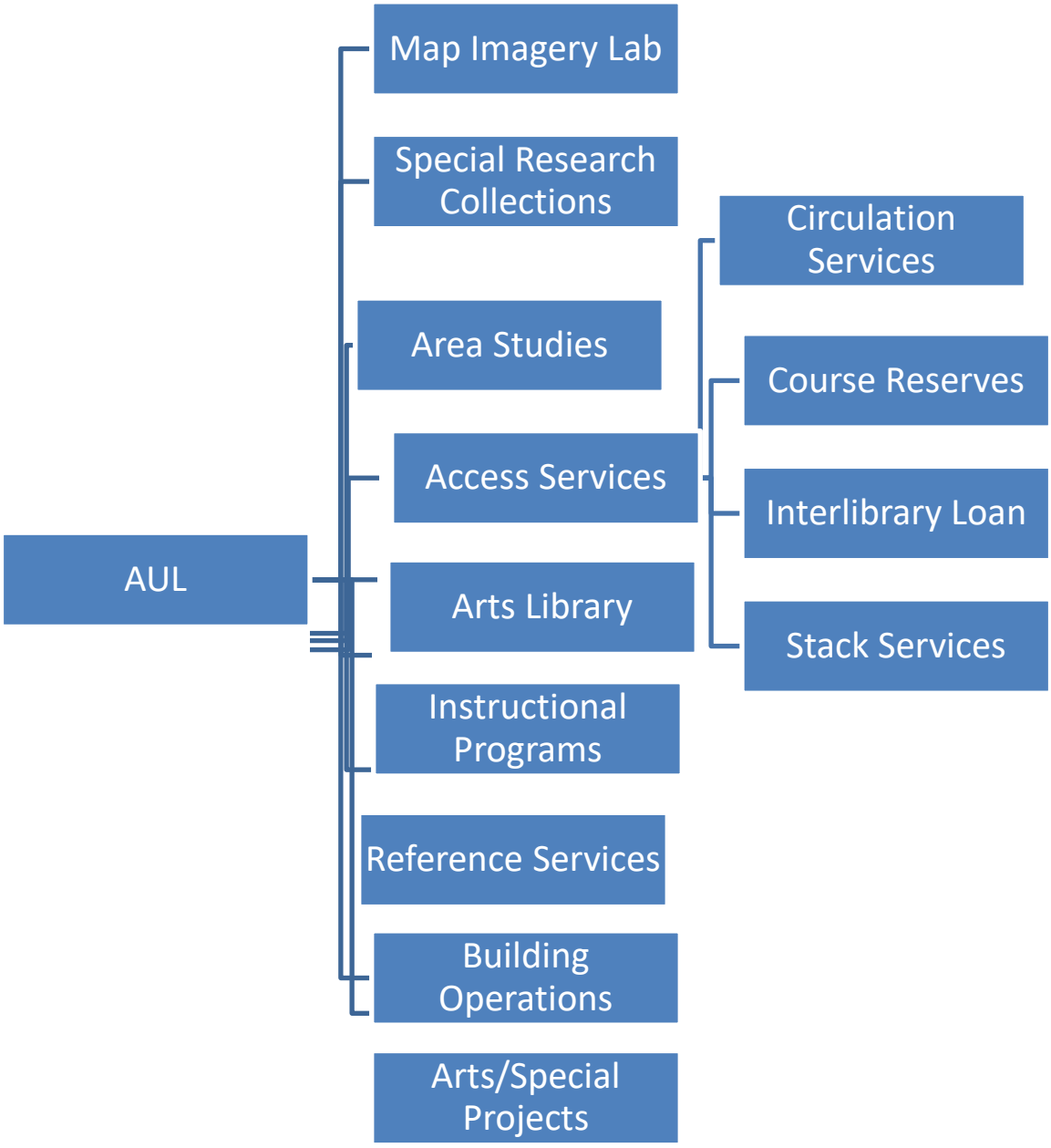
Appendix 1
Organizational Charts – Divisional Chart



Organizational Charts: Collection Services



Organizational Chart – Research and Scholar Services



Appendix 2
Example Interview Protocol

Preliminary Questions: (these do two things: they help place the department and the interviewee in the org as a whole and they start to look for coordination, interdependencies and maybe uncertainty)

I have just a few questions that helps us get a better grasp on your role and the role of the department(s) you are a part of and how that all fits into the library as a whole:

You work in _____ department correct?

How long have you worked in this department(s)?

Who do you report to?

Do you have people that report to you?

How many and what are their positions?

Can you tell me a little about your role in the library? In the department?

How about the departments role in the library as a whole?

If you had to identify the main output of your department what would it be…what are you working towards?

How do you know you have achieved that?

Can you walk me through a typical day for you…how about for your department as a whole?

How much do you and others in your department rely on each other to do their work…how about to achieve the goals of the department or the organization? (prompt with ideas like, are there things that can't get done if someone is out for the day, or do you work on projects together or individually)

Do you rely on others outside your immediate team or department to get your work or tasks done?

How? Can you give me an example?

How do you know that your work is done/what is the goal of your department/If you had to set an outcome of your or your departments work, what would it be?

What is success for you or your team?

How do you know what you are supposed to do? How about others in your department

These next begin to look at how mechanisms are brought to bear on achieving coordination

I know the library has undergone a lot of structural change in recent years, can you give me an example of something within your work that was changed or disrupted due to these changes?

(the hope with this question is that they will offer something procedural or structural that affected the alignment of work. If not the next few will need to be held off on until they offer something worth digging into, maybe by asking, "can you talk to me about a time where a change disrupted your workflow or changed how you or your department did their work?)

(If they don't give anything here go to their training or their training of others and edit these questions to look at that)

How are new employees trained in your department (or how where you trained)

How did the change affect your work flow?

How were you informed of the change?

How did you inform your staff of the change?

Which (of those ways) do you find most effective?

How did you learn to the new processes or work flows?

How predictable is your work…the work of your department (this gets at uncertainty)

Were there any materials that you were given (e.g. training manuals etc)?

Do you still access those ever?

How did that change affect your job?

Are there aspects of your job that you once had to think about but now just seem to happen without even thinking about them (give some examples of routines to prompt if needed)

Can you tell me about a time that you were doing something that is typically routines, but that something made you have to stop and evaluate that routine?

During the changes noted above were there ways that routines were interrupted? How did you know you back in the grove after the change?

If there is something you don't know how do you find the answer?

Can you give me an example?

Where do you go to find information about things going on in your work?

Who do you generally ask questions of? What about?

Who asks questions of you? What about?

How often is your work reviewed by supervisors?

How is that done?

Do you have access to those reviews after the fact and if so do you access them?

Appendix 3

Scale Data Source

[go through all of this and make all the indents and bullets consistent.]

Ballard and Siebold 2004 [items for interdependence and coordination]

Brief Interviews: questions asked of supervisors to assess communication structures (supplemented with Qualitative Observation)

The following questions assess levels of <u>interdependence</u> and <u>corresponding coordination methods.</u>

- "Does your group work relatively interdependently from others?"
- "Or is your basic work process highly dependent upon another units' or vice versa?"
- "Are you able to plan your groups' work and generally stick to those plans despite what other work groups do?"
- "Does your work group have to wait on others to complete their work before you can finish yours?"
- "Do others depend on you to complete your work before they can complete theirs?"
- "Is it important for you to adjust or adapt what you are doing based on the other group's performance?"
- "Do you need to communicate often with the other group in order to complete your work?"
- "Do you often have to change your original plans in the midst of your work based on another group's performance?"

Cheng 1983 [items for interdependence and Coordination]

<u>Interdependence</u> measured using modified Mohr's (1971) scale. (adequate construct validity according to Van de Ven et al. 1976)

- "Unit heads asked to indicate extent to which the nature of the research work in their unit required its members to work closely with one another (as opposed to working individually).

<u>Coordination</u> measured with modified Georgopoulos and Mann's (1962) scale. (Scale has shown high reliability and validity)

- alpha coefficient of index: .81
- Inter-item Correlation of .69
- Staff researchers asked to
  - Indicate the extent to which the research program of the unit was coherent (as opposed to fragmented)
  - Indicate the extent to which the research planning in the unit was well conceived.

Faraj and Sproul 2000 [items for SOCM, CIM, Coordination, Resource Knowledge]

Cronbach alpha levels of all variables at team and individual level all greater than .74

Administrative Coordination (Conscious Interaction Mechanisms and Stored Organizational Coordination Mechanisms) measured using Kraut and Streeter (1995) formal and interpersonal administrative coordination measures.

Used a 6 item scale, range: from " to a small extent" to "a great extent." (alpha = 0.82, mean = 3.49, s.d. = 0.56)

Extent of use of

- Formal policies and procedures for coordinating the team's work
- Project milestones and delivery schedules
- Project documents and memos
- Regularly scheduled team meetings
- Requirements/design review meetings
- Design inspections

Factor Analysis for Expertise Coordination

Measured using 5 point Likert scale (anchors: to a very small extent – to a very large extent)

Resource Knowledge

- "The team has a good 'map' of each others' talents and skills."
- "Team members are assigned to tasks commensurate with their task-relevant knowledge and skill."
- "Team members know what task-related skills and knowledge they each possess."
- "Team members know who on the team has specialized skills and knowledge that is relevant to their work."
- "Some team members lack certain specialized knowledge that is necessary to do their task."
- "Some people on our team do not have enough knowledge to do their part of the team task."

Coordination

- People in our team share their special knowledge and expertise with one another
- If someone in our team has some special knowledge about how to perform the team task, he or she is not likely to tell the other member about it.
- There is virtually no exchange of information, knowledge, or sharing of skills among members
- More knowledgeable team members freely provide members with hard-to-find knowledge or specialized skills

Gittel 2001 [items for interdependencies]

Measuring relational coordination (interdependencies)

- Cronbach's alpha: 0.842
- On a scale of 1 to 5, …
    - How often do you communicate with the people in these groups? (1= constantly, 5 = never)
    - Do the people in these groups communicate with you in a timely manner? (1 = usually, 5 = never)
    - If there's a problem with a flight, do people in these groups work with you to try to solve the problem or do they try to avoid getting blamed? (1 = try to solve the problem, 5 = try to avoid blame)
    - How much respect do you get from people in these groups? (1 = a lot, 5 = not much)
    - How much help do you get from people in these groups? (1 = a lot, 5 = not much)
    - How much do people in these groups know about your job? (1 = a lot, 5 = not much)
    - Do the people in these groups have the same work goals as you? (1 = a lot, 5 = not much)

Gittel 2002 [items for coordination/interdependencies]

Measuring coordination/interdependencies. Responses measured on 5 point Likert's Scale. Cronbach's alpha = 0.8, p =0.0003, p>0.0007

- How frequently do you communicate with each of these [functions] about the status of joint replacement patients?
- Do people in these [functions] communicate with you in a timely way about the status of joint replacement patients?
- Do people in these [functions] communicate with you accurately about the status of joint replacement patient/
- "When an error has been made regarding joint replacement patients, do peope in these [functions] blame others or share responsibility?
- To what extent do people in these [functions] share your goals for the care of joint replacement patients?
- How much do people in these [functions] know about the work you do with joint replacement patients?
- How much do people in these [functions] respect you and the work you do with joint replacement patients.

Georgopolous and Mann(1962)

Referenced in Cheng 1984 - Coordination measured with measure developed by [which I was unable to access…]

Hoegl et al (2004) [Items for Coordination]

Measurement scale for interteam coordination has Cronbach's alpha= 0.85

Teamwork quality (look at Hoegl and Gemeunden 2001) had Cronbach's alpha between 0.70 and 0.89

Total of 20 survey items for 6 facets (communication, coordination, balance of member contributions, mutual support, effort, and cohesion)

Teamwork quality: used items from Hoegl and Gemeunded (2001) (Cronbach's alpha = 0.88)

Measuring Communication:

- There was frequent communication within our team.
- There was intensive communication within our team.
- Team members openly shared project relevant information.
- The team members were happy with the timeliness in which they received information from other team members.
- The team members were happy with the accuracy of the information received from other team members.

Measuring Coordination:

- The work done on subtasks was closely harmonized.
- Our team avoided duplication of effort.
- Connected subtasks were well coordinated in our team.

Measuring Mutual Support:

- Discussions and controversies were conducted constructively.
- Suggestions and contributions of team members were respected.
- Suggestions and contributions of team members were discussed and further developed.
- There was a cooperative work atmosphere in our team.

Measuring Balance:

- All team members were equally engaged to achieve the common goals.
- All team members were fully contributing to our team.
- The team members complemented one another as best as they could.

Interteam Coordination: (partially adapted from scales used by Mott 1972) (Cronbach's apha = 0.85

- Connected processes and activities were well coordinated with other teams.
- Duplicated and overlapping activities were avoided.

- We had no problems in coordinating with other teams.
- Conflicts with other teams were settled quickly.
- Discussions with other teams were conducted constructively.

Project Commitment: Cronbach's alpha = 0.75

- Our team feels fully responsible for achieving the common project goals.
- This project has the strong commitment of out team members.
- The team members are proud t be part of the project.
- The team members are committed not only to their teams, but to the overall project.
- Our team values to be part of this project.

Janicik and Bartel 2003:

Assessing extent to which temporal planning contributes to coordination/performance

Use 7-point scale to indicate level of agreement.
4 dimensions:

- Time Awareness Norms (Cronbach's Alpha = 0.90) [SCM]
  - Group members felt that deadlines didn't really matter.
  - Staying on schedule was important in our group.
  - It was important to meet the deadlines that we set for ourselves
  - We didn't pay much attention to schedules we set for ourselves.
  - It was very important to be "on time" for everything.
  - Group members did things when they were ready, we did not schedule for our work.
  - Most group members didn't think about how they used their time.
  - Group members worried about using their time well.
  - Group members planned their time very carefully

- Temporal Planning (Cronbach's Alpha = 0.84) [CIM]
  - To what extent did your group prioritize tasks and allocate time to each task?
  - To what extent did your group discuss any deadlines?
  - To what extent did your group prepare and build-in time for contingencies, problems, and emerging issues?
  - To what extent did your group discuss how often it was going to meet?
  - To what extent did you discuss how long each particular task would take?
  - To what extent did your group set milestones to measure progress on the project?
  - To what extent did people compare their personal schedules for meetings, project-related tasks, etc.
- Strategic Planning (Cronbach's Alpha = 0.79) [CIM]
  - To what extent did your group review the project-relecant knowledge and experience of each member before deciding how to proceed with the work?
  - To what extent did your group study in detail the projects requirements before studying before starting?
  - To what extent did your group spend time planning how it will do the project?

        - To what extent did your group discuss how to integrate the different components of the project?
        - To what extent did your group discuss the resources it had for the project?
        - To what extent did your group discuss the resources it had for the project?
        - To what extent did your group discuss who would do what for the project?
    - Coordination Difficulties (Cronbach's Alpha = 0.81) [Coordination]
        - My group had some trouble coordinating the pace members wanted to work at (i.e., some members wanted to work faster or slower than others).
        - My group had difficulty with timing interactions between members (i.e., when members would work or consult with one another).
        - My group experienced interruptions or delays in the flow of work between members.

Pinto, Pinto, and Prescott 1993 (only representative questions were found in the article) [items for SCM]

Superordinate Goals

- 7-point Likert Scale ranging from strongly disagree to strongly agree. (alpha = 0.91)
    - "All project team members are committed to the same project goals."

Rules and Procedures

- Org. rules and procedures assessed with 5-item Likert Scale, ranging from strongly disagree to strongly agree. (alpha = 0.90)
    - "For most problems that arise on this project, there are rules and procedures for dealing with them. [SCM, non-physical through observable]

Accessibility

- 7 point Likert Scale from "none" to "all"
    - "How many members of the project team are inaccessible to you for reasons other than their physical location in the hospital?"[SCM, physical and observable]

Cross-Functional Cooperation

- 7 point Likert Scale (Alpha= 0.92)
    - "open communication of relevant information occurs among project team members."

Steward, Walker, Hutt, and Kumar 2010 [items for relational knowledge]

Diversity of Internal Relationships

(adapted from Lewis 2003) Cronbach's alpha = 0.7

Responses ranging from 1= "strongly disagree" to 5= "strongly agree".

Based on what you know about _____ network of relations, how would you rate _____'s network on the following areas?

- The people in _____'s network of relations each have knowledge about an aspect of the projects that no other team member has.

- The people in _____'s network of relations have the highest degree of non-overlapping knowledge.

Strength of Internal Relationships

(adapted from Brown and Reingen 1987) Cronbach's alpha = 0.81

- How frequently did you interact with _____?

  Responses:

  1: less than once a month

  2: one to three times a month

  3: one to three times a week

  4: four to five times a week

  5: more that once a day
- How close is your relationship with _____
  - Responses ranging from 5=extremely close to 1= more distant
- How important was your interaction with each of these individuals?
  - Responses ranging from 5=very important to 1=not at all important

Van de Ven, Delbecq, and Koenig 1976 (Survey Items for interdependence, uncertainty, and coordination)

Measuring interdependence based on Mohr's (1971) index. Answered along 10 point scale:

- To what extent do the people in this unit have one person jobs: that is, in order to get the work out to what extent do unit members independently accomplish their own assigned tasks?
- To what extent do all the unit members meet together to discuss how each task, case, or claim should be performed or treated in order to do the work in this unit?

Perceived task uncertainty measure as average response of all unit personnel to following questions

- To what extent is there a clearly defined body of knowledge or subject matter which can guide you in doing your work?
- During the course of your work, how often do you come across specific but difficult problems that you don't know how to solve, and you have to take some time to think through by yourself or with others before you can take any action?
- In general, how much actual "thinking" time do you usually spend trying to solve such specific problems?
- In some jobs, things are fairly predictable. In others, you are often not sure what the outcome will be. What percent of the time would you say that you are generally sure what the results of your efforts will be?
- In terms of the major tasks you are assigned, on the average how long is it before you know whether your work effort is successful?

- How much variety in cases, claims, clients, or things do you generally encounter in your normal workday?
- Regardless of the variety of cases, claims, or clients, to what extent are the activities or methods you follow in your work about the same for dealing with classes of categories of cases, claims, or clients.
- To what extent do people in this unit do about the same job in the same way most of the time?
  (alpha: 0.92)

Measuring the use of different modes of coordination

(answered on a ten- interval scale ranging fro 1: "used to no extent" to 10: "used to great extent.

Impersonal:

- Indicate the extent to which each of the following mechanisms were used to coordinate the work among unit personnel within the unit.
  - Through formally or informally understood policies and procedures for coordinating the work within the unit.
  - Through predetermined work plans or work schedules for coordinating the work within the unit.

  Personal:

- Indicate the extent to which each of the following mechanisms were used to coordinate the work among unit personnel within the unit.
  - Through the unit supervisor as a coordinator of work within the unit.
  - Through an assistant unit supervisor who is responsible for coordinating the work within the unit.
  - Through a formally designated work coordinator(rather than a line supervisor)
  - Through informal communication channels (simply contacting another unit member who is likely to have the desired information).

  Group:

- Indicate the extent to which each of the following mechanisms were used to coordinate the work among unit personnel within the unit.
  - Through a standing committee that meets regularly to plan and coordinate the work within the unit.
  - Through staff meetings that are held to coordinate the work within the unit.
  - Through a group brought together for problem solving on particular issues relating to the work within the unit.

Yuan et al 2007 (survey items for SOCM and Resource knowledge)

Individual Direct information exchange with team members

- Please indicate whether you have provided unsolicited information to member XX about Knowledge Are YY in a typical week.

- Please indicate whether you haveretrieved information from member XX about knowledge area YY in a typical week.

Individual perceived Usage of Organizational repositories:

- How often do you think you and other members of your team retrieved information from the intranet during the past week about (certain knowledge area)?
- How often do you think you and other members of your team provided information to the intranet during the past week about (certain knowledge area)?

Perceived provision level of organizational repositories measured with 6 items. Cronbach's alpha= 0.92. Responded to on an 11 point scale ranging from "none" to "totally".

- To what extent do people in X company provide all their work related information on the intranet?
- To what extent is that information used by everyone else?
- To what extent are you able to access everyone's work-related information?
- Too what extent are employees willing to share work-related information with everyone else?
- To what extent is everyone able to access everyone's work-related information?
- To what extent are employees willing to use work-related information that others have made available via the intranet?

Individual actual usage of organizational repositories. Used 5 point Likert-type response categories varying from "never" to "very often". Cronbach's alpha = 0.91

During your last full week of work, how often did you use the intranet to …

- Access a database to obtain information needed for your job that was not available elsewhere?
- Access a database to obtain information needed for your job from persons you did not know?
- Access a database to obtain information needed for your job that was from persons you did know?
- Locate someone who could get you needed information for your work?
- Find information posted by others?
- Access information to find out who was knowledgeable about a particulat problem, issue, or topic?
- Identify experts in a particular area?
- Contribute information to a database that otherwise would not be readily available to others who needed it?
- Contribute information to an intranet site without knowing who, specifically, might find it useful?
- Contribute information to an intranet site for use by people with whom you were already acquainted?

Individual access to information about quality and quantity of information obtained to perform tasks. Measured on a 5 point scale, responses ranging from “strongly disagree” to “strongly agree”. Cronbach’s alpha = 0.85

In responding to the following items, keep in mind activities that you have worked on in the last week.

- The amount of information available to me is sufficient for me to make good decisions.
- Most information I receive is very valuable.
- I have found that information is generally complete enough for me to make good decisions.