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Accomplishing Authority in Collaborative Work

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The purpose of our study is to explore the issue of authority in collaborative work, with a focus on overcoming or transforming existing forms of authority. To accomplish this we begin by reviewing the literatures on collaboration, organizational authority, and communicative constitution to provide a theoretical framework for our empirical investigation. Next we present a case study of a large scientific laboratory and members' attempts to achieve collaboration as they expanded into a new facility. This case demonstrates that authority in collaboration involves both authoring and de-authoring, as people create new systems of influence and accountability while simultaneously erasing prior authoritative forces that undermine collaborative work. We conclude with a discussion about the contributions of our research.

Keywords: Authority; CCO; Collaboration; Organizational Communication

Collaboration is a hallmark of 21st-century organizing across all economic sectors. From interorganizational partnerships to intraorganizational initiatives, today's organizational landscape is defined by interdependent groups of diverse stakeholders working together to accomplish some measure of collective action that could not be achieved individually. Despite its significance, collaboration is also complicated, and many collaborative efforts fail (Gray, 2000; Hardy, Lawrence, & Grant, 2005). In particular, authority is a central problem for collaborative work.

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Any organizational arrangement requires some system of authority to coordinate collective action (Taylor & Van Every, 2011), but collaboration brings together people and organizations that generally do not have authority over each other. Collaboration blurs the boundaries between groups and gives rise to ambiguous authority relations that are not easy to reconcile (Koschmann, 2013). This makes it difficult to accomplish collaborative goals because there is no formal authority to mediate between competing interests or induce action toward certain priorities. The challenge for collaboration is to establish a system of authority capable of coordinating the diverse interests of multiple stakeholders, but apart from hierarchical mechanisms of control (Lawrence, Hardy, & Phillips, 2002).

Traditionally, organizational studies portrays authority as an objective feature of hierarchical relations that is exercised through managerial power and control (Kuhn, 2008). However, in collaborative work arrangements authority is less about holding a formal position in a hierarchy. Instead authority is often negotiated among organizational members because the complexity of modern organizing makes it increasingly difficult to specify in advance exactly who is responsible for various aspects of task performance (Kahn & Kram, 1994). This alternative approach conceives authority as a distributed phenomenon that is shared between people across organizational levels and divisions. Organizational collaboration thus depends on negotiated authority—a social accomplishment that is achieved in interaction. This shifts the emphasis away from hierarchical positions and more toward the meanings and interpretations that are worked out among organizational members in practice.

Communication scholars have made important contributions to this literature by articulating a unique approach to organizational authority based on a constitutive model of communication. In particular, scholars aligned with the Montréal School of organizational communication (see Brummans, Cooren, Robichaud, & Taylor, 2013) theorize organizational authority as a process of *authoring*, where people struggle to "write" an official version of the organization that conveys specific notions of purpose and identity (Cooren, 2010; Kuhn, 2008; Taylor & Van Every, 2014). This relates to the textual existence of organizations, where organizations are understood as interrelated networks of meaning that are "read" in ways that convey authority and facilitate coordinated action (Kärreman, 2001; Westwood & Linstead, 2001). Authority is not in a position or a person who gives commands, but rather in the continual process of authoring a definitive representation of the collective. This is especially relevant for collaborative work, where negotiated authority is even more salient because of the absence of hierarchical mechanisms of control. Collaborative partners are not necessarily bound to prior authority relations so they constantly negotiate to write and rewrite (i.e., author) systems of authority to coordinate their work.

Research to date focuses on how authority is created and maintained through communication (see Benoit-Barné & Cooren, 2009; Brummans, Hwang, & Cheong, 2013; Cooren, 2010; Cooren, Brummans, & Charrieras, 2008; Taylor & Van Every, 2011). However, collaboration involves the convergence of already-established authority relations, cultural assumptions, and norms of operation that may not be

compatible. This does not simply entail revising the chain of command to reflect collaborative arrangements in a new organizational chart, but instead necessitates managing rival conceptions of power and control that influence how people work and make decisions. Merely establishing new systems of authority is insufficient; existing authoritative influences may also need to be overcome or transformed in order to achieve collaboration. This issue has received far less attention in the literature but it is significant for understanding collaborative work.

The purpose of our study is to explore the issue of authority in collaborative work, with a focus on overcoming or transforming existing forms of authority. To accomplish this we begin by reviewing the literatures on collaboration, organizational authority, and communicative constitution to provide a theoretical framework for our empirical investigation. Next we present a case study of a large scientific laboratory and members' attempts to achieve collaboration as they expanded into a new facility. This case demonstrates that authority in collaboration involves both authoring and de-authoring, as people create new systems of influence and accountability while simultaneously erasing prior authoritative forces that undermine collaborative work. We conclude with a discussion about the contributions of our research.

LITERATURE REVIEW AND RESEARCH QUESTIONS

Following the conventions of inductive, practice-based research (Craig & Tracy, 1995) we explored issues of collaboration and communication with laboratory members to see what issues they were facing and what specific topics would stand out to guide a more targeted investigation. After 7 months of initial observations and discussions with key informants, authority emerged as a central issue warranting further analysis. We reviewed the literature on collaboration and authority to better inform our fieldwork. Although our literature review is summarized first, our examination of previous research was concurrent and reflexive with the empirical investigation. This process of "theoretically-informed induction" (Tracy, 2007) ensured that our conceptual framework was guided by empirical observations and vice versa.

Collaborative Work

Collaboration is a defining feature of many organizations today, both in terms of necessity and opportunity. The complexity, uncertainty, and task interdependence of work in many industries mean that specialized routines and vertical chains of command are often insufficient and ineffective (Faraj & Xiao, 2006). The projects that many organizations pursue often blur the boundaries between traditional work units and require expertise from different knowledge domains (Majchrzak, More, & Faraj, 2012). Therefore, success for many organizations depends on the ability to create adaptive capacities through collaboration among diverse groups who

coordinate their efforts to accomplish collective goals (Kellogg, Orlikowski, & Yates, 2006). There is also growing recognition that collaboration is necessary so people who are affected by organizational outcomes can participate in the relevant decision-making processes (Deetz, 1995); so too it is increasingly difficult for executives to have enough information and expertise to manage tasks on their own (Franz & Jin, 1995). Furthermore, collaboration offers opportunities for new ideas, competitive advantages, and improved service delivery. Innovation often occurs when domains of knowledge and expertise intersect and cross-pollinate (Bruns, 2013). Consequently, collaboration can provide organizations possibilities for new insights and novel solutions to complex issues. All told, the demands and opportunities of the contemporary world make collaborative work an essential aspect of today's organizational landscape.

Collaboration is a prominent and extensive topic in organizational studies, covering a wide range of inter- and intraorganizational arrangements, and generally involving interdependent groups of varied stakeholders coming together to achieve some measure of collective action they could not otherwise accomplish individually. Sometimes collaboration entails formal relationships that result in new entities or enduring linkages, but in other situations collaborative work involves ad hoc and temporary arrangements that bring together specialists with diverse capabilities and expertise for a specific task or issue. In either case, collaboration is difficult, especially since collaboration brings people together who represent different knowledge domains and who normally do not work with each other, but who still need to coordinate across boundaries to solve complex problems that have unique task requirements (Kellogg et al., 2006; Majchrzak et al., 2012). Thus collaboration complicates important issues such as knowledge sharing (Bechky, 2003), identity and trust (Beech & Huxham, 2003; Zhang & Huxham, 2009), and leadership (Huxham & Vangen, 2000) that may be more conventional in other organizational contexts.

Authority is another problematic issue for collaboration. Collaboration requires integrating specialized domains of knowledge and practice (Majchrzak et al., 2012), but without clear means for reconciling knowledge differences, power asymmetries, and other "jurisdictional conflicts" (Kellogg et al., 2006, p. 22) that are inherent to collaborative work. Conventional mechanisms of control, hierarchies, and rule-based schemes are less helpful because of the uncertainty and complexity involved in collaboration (Jarzabkowski, Lê, & Feldman, 2012). Yet collaborative work still requires a system of authority to ensure accountability (Okhuysen & Bechky, 2009; Taylor & Van Every, 2011) because the diversity of perspectives invites contestation about how tasks should be accomplished (Bruns, 2013). Accordingly, an important question for collaborative work is how to develop a sufficient authority system to coordinate the diverse interests and knowledge domains of multiple stakeholders, yet apart from hierarchical mechanisms of control. Answering this question requires a shift from traditional thinking about authority in favor of more emergent forms of accountability that are negotiated in practice and transcend organizational hierarchies and boundaries.

Authority and Organizations

Traditional approaches to authority are grounded in the early works of Weber (1968/1922), Barnard (1938), and Fayol (1949), which view authority as an objective feature of hierarchical relations exercised through managerial power and control (Kuhn, 2008). From this perspective authority is a rational-legal or legitimate form of power derived from one's bureaucratic position. Authority is thus something people "have" by virtue of their place within an organizational structure. This approach is especially relevant for hierarchical and bureaucratic organizations that operate according to power vested in specific offices and departments (Kahn & Kram, 1994).

However, the nature of today's organizational landscape calls into question traditional approaches to authority for several reasons. The substantial increase in collaborative work complicates straightforward authority relations that are presumed in hierarchical and bureaucratic forms of organizing. Additionally, the complexity and uncertainty characteristic of so many organizations make it difficult to specify in advance exactly how tasks should be completed, who should be involved, and where responsibility lies (Kahn & Kram, 1994). There is also a "decoupling" of position and expertise in many organizations today, which means that people who are most knowledgeable about certain tasks are often not the ones in formal positions of authority, thereby creating a power imbalance between management and employees (Barley, 1996). As a result, Hirschhorn (1998) concluded that the control systems developed for a century of industrial work are much less useful in modern work environments.

Accordingly, many scholars now conceptualize authority as a negotiated phenomenon distributed among organizational members, emphasizing more emergent forms of influence and accountability that transcend boundaries and hierarchies (cf. Kahn & Kram, 1994; Okhuysen & Bechky, 2009). The key point is that authority is worked out in practice as people interact with each other and make decisions about the scope of power they have over each other and their tasks. Yet this raises a question of how local interactions can actually create the authority needed to coordinate and manage work across domains of knowledge and expertise. Organizational communication scholars have been especially interested in this question, and recent literature on the communicative constitution of organizations offers important insights to enhance our understanding of authority.

Communicative Constitution of Organizational Authority

Scholars aligned with the Montréal School of organizational communication (see Brummans et al., 2013b) have done the most extensive work to theorize authority as a negotiated and distributed phenomenon grounded in interaction (see Benoit-Barné & Cooren, 2009; Brummans et al., 2013a; Cooren, 2010; Kuhn, 2008; Taylor & Van Every, 2011, 2014). In particular, this research depicts authority as a process of *authoring* where people struggle to "write" an official version of the organization that conveys

specific notions of purpose, direction, and identity. This conception of authority relates to the textual existence of organizations, where interrelated networks of meaning are "read" in certain ways to enable coordinated action (Kärreman, 2001; Westwood & Linstead, 2001). Texts in this sense can be both concrete and figurative. Concrete texts are tangible signs and symbols that have a fairly permanent form, such as documents and policy statements; whereas figurative texts are abstract depictions of organizational practice (Kuhn, 2008). Figurative texts help explain why people often refer to organizing or coordinating as "being on the same page," while not denoting any formal documents per se. Whether concrete or figurative, texts themselves can develop authority through the processes by which they are authored. This happens as localized interactions "scale up" (Cooren & Fairhurst, 2009) and gain distance from their immediate circumstances, a process Ricoeur (1991) calls *distanciation*. The result is more than a loose collection of texts, but an organizational abstraction taken to represent all the interactions this abstraction refers to (Taylor, Cooren, Giroux, & Robichaud, 1996).

For Montréal School theorizing, this emergent abstraction can become a source of authority for collective action. Distanciation creates ambiguity because the textual outcomes of interaction are inevitably generalized and simplified as they gain distance from their original context. The resulting abstractions tend to discard evidence of individual authorship, meaning that the intentions and contributions of specific people are excluded or ignored and the remaining abstractions themselves become the focus of subsequent interactions. This is why, for example, it is more authoritative for the abstraction "the White House" to release a statement than specific officials in the administration. Texts must shed evidence of individual authorship and portray a collective accomplishment (whether intentional or not) that is seen as legitimate and commanding. It is this "vanishing" (Taylor & Van Every, 2011) of individual authorship that enables abstractions to develop authority. Increasingly, as more agency is attributed to the abstraction itself, it becomes reified in ways that convey authority and power.

Authority is now attributed to the abstraction instead of any particular individual, and collective agency is now exercised in the name of this abstraction, what Kuhn (2008) refers to as an *authoritative text*. Authoritative texts are figurative texts that portray an organization in ways that specify roles, duties, values, activities, outcomes, etc., while also explaining relations of power and legitimacy. Authority is then inscribed in efforts to shape the *trajectory* of an authoritative text—a qualitative characteristic of authoritative texts indicating the course or general direction of the collective (Koschmann, Kuhn, & Pfarrer, 2012). Authority, then, is not in a hierarchical position or a person who gives commands, but rather in the process of authoring a definitive representation of the collective.

Yet, authority cannot merely "exist" abstractly as an authoritative text; sources of authority must also be made present in interaction, a process Cooren (2006) and his colleagues refer to as *presentification* (see also Benoit-Barné & Cooren, 2009; Cooren et al., 2008). Presentification happens through material objects that "incarnate" (Cooren, 2010) organizational authority, such as buildings, logos, signs, memos, or company spokespeople. Authority is also made present as people

invoke various organizational texts as unitary sources of agency to justify certain actions or decisions. Not only must authority be made present, but it also needs to be recognized and accepted (even if subconsciously) for it to have any meaningful impact for the collective. This is what makes authority a negotiated or coconstructed phenomenon—authority is simultaneously an effect of both presence and consent that is accomplished in interaction (Cooren, 2010). Accordingly, extant research focuses primarily on how authority is established and sustained through communication (see Benoit-Barné & Cooren, 2009; Brummans et al., 2013; Cooren, 2010; Cooren et al., 2008; Taylor & Van Every, 2011, 2014).

Despite these important insights about how authority is created and maintained through communication, much less is known about how authority is revoked, abolished, or otherwise undone. This issue has received limited attention in the literature, but it is crucial for understanding collaborative work. Collaboration rarely happens from scratch, but rather involves the convergence of established authority relations, cultural assumptions, and norms of operation that are often incompatible. This does not simply entail revising the chain of command to reflect collaborative arrangements in a new organizational chart, but instead necessitates managing rival conceptions of power and control that influence how people work and make decisions. Not only do new systems of authority need to be created and maintained, but established authoritative influences may also need to be overcome or transformed in order to achieve collaboration. Previous literature focuses on how individual members are discredited and lose their authoritative status in organizations (Bransford, 2006; Kahn & Kram, 1994); other research emphasizes broader processes of deinstitutionalization that involve large-scale societal changes (Ahmadjian & Robinson, 2001; Maguire & Hardy, 2009). Missing, however, is examination of de-authorization at the organizational level where established (yet problematic) forms of authority are eliminated or changed in order to enable collaborative work. Van Vuuren and Lohuis (2014) hint at this approach towards the end of their analysis of organizational change. They note the lack of research on "rewriting" or "erasing" authoritative texts in situations of planned or strategic change, and they call for future studies to address this absence. Their call is equally relevant for the context of collaboration; hence our investigation was guided by the following research questions: how is authority accomplished in collaborative work, and how are existing forms of authority overcome or transformed to achieve successful collaboration?

METHODS

Research Site

The National Science Center (NSC)[1] is a federal government laboratory in the Western United States. In 2012 NSC opened a new 58,000-square-foot building called the Precision Measurement Laboratory (PML), which contains 68 separate labs organized into various lab block groups. This is one of the most advanced

scientific facilities in the world, with special emphasis on enhanced measurement of individual atoms, photons, and quantum particles. The PML was created to house NSC's expanding operations and to overcome difficulties with quality, safety, and resource allocation that plagued its work in the previous building, and culminated in a major incident involving a plutonium spill in 2008. However, NSC recognized that a new building alone would not solve these problems—they also had to organize and work together differently. Coordinating the work of multiple scientists, laboratories, and the facilities/maintenance staff within the new PML building would be a substantial collaborative challenge, especially given the adversarial relationships among scientists and building managers that characterized their work in the old building.

Yet roughly 2 years after they began this new endeavor, the people involved with the new PML building were recognized for their efforts to achieve collaboration. In November 2013 NSC received a national safety award from the federal laboratory system for the work of the PML operations group and the galley safety representatives, both of which were new ways of organizing in federal laboratories to improve cross-domain collaboration. At the award ceremony NSC was recognized for "pioneering new multidisciplinary and cross-organizational approaches to complex safety challenges in the Precision Measurement Laboratory" and for "unusually significant contributions to collaborative safety." This was seen as quite an accomplishment, especially in light of the plutonium spill just a few years earlier. Our case study emphasizes authority and collaboration to explain how NSC was able to make this progress.

Soon after the new building opened in 2011 we were invited to observe the transition process as an outside research team. We were asked to document NSC's efforts to "develop a more collaborative and cooperative culture" in the new PML facility. We focused on two key sites of collaborative work: (1) the new PML operations group and (2) the laboratory galley spaces. First, the PML operations group was formed to coordinate work across the new laboratory building and create better working relationships between the scientists and the building staff. The PML operations group consists of lab block representatives and building managers and they meet biweekly to discuss various issues associated with the new PML building, especially regarding the coordination of resources and building controls that are shared across multiple labs or affect everyone else in the facility. Second, the laboratory galley spaces are large corridors between each laboratory block where equipment and materials are stored. These communal spaces are used by multiple labs but controlled and maintained by the building staff, not the scientists themselves. According to the PML operations group, the six galley spaces are some of the "most dangerous places in the building"—numerous chemicals are stored there, materials and resources are constantly being moved in and out, and many people coming and going are unaware of everything else taking place around them in other labs—and therefore "ground zero" for achieving and assessing collaboration.

Case Study Approach

We followed the general tenets of case study methodology (see Yin, 2009) to inform our investigation. Our goal is to tell the story of the PML facility and how the people involved were able to achieve a notable level of collaboration in an environment previously known for its lack of collaboration, one which culminated in a major safety incident (the plutonium spill). The crux of this narrative involves the notion of authority, or how these people authored new forms of influence and coordination while simultaneously de-authoring a deficient authoritative text that threatened their collaborative efforts. We present our research findings thematically (though not necessarily chronologically) in order to showcase key events that occurred during our 2-year investigation. Our work aligns with process studies of management and organization, where the emphasis is on how things develop over time (in contrast to variance research, which emphasizes relationships between variable levels of inputs and outputs) (Denis, Lamothe, & Langley, 2001). We utilize a strategy of "temporal bracketing" (Langley, 2010) to arrange the four themes of our analysis. In this approach time periods do not have any theoretical significance—they are not stages but rather ways of structuring the description of events. Many temporal processes can be decomposed this way without assuming a logic of sequential progress or development (Langley, 1999). Instead, the analytic themes involve events that diverge and feed back upon each other in ways that complicate linear phase models, yet still transpire over a set period of time. Temporal bracketing allows us to transform our extensive amount of qualitative data into discrete but connected themes while still capturing the progression of time that shapes the overall narrative.

Data Collection

Data came from two primary sources: field observations of PML operation group meetings and galley spaces, and interviews with key informants. We also reviewed a number of documents (e.g., memos, meeting summaries, floor plans, organization charts) to supplement our observations and interviews as a measure of interpretive validity. We observed 40 meetings over 23 months, totaling 68 hours and resulting in 112 pages of single-spaced field note text. We did not have permission to video- or audio-record anything in the PML building, but we did have access to meeting agendas and minutes, and follow-up conversations enabled us to clarify our observations. We also conducted in-depth interviews with 12 key members of the PML facility, including members of the PML operations group, galley safety representatives, lab block members, individual scientists, and building managers. Interviews averaged 35 minutes in length and were digitally recorded for transcription and analysis, resulting in 144 pages of single-spaced text. Interviews were semistructured with several open-ended questions about working in the PML facility and coordinating with other members, plus more targeted questions about specific issues relevant to each interviewee. We also had several additional informal discussions with all of our interview participants at meetings and over lunches, which we recorded in field notes and extra research memos.

Data Analysis

Given the inductive and interpretive character of our case study, data collection and analysis occurred simultaneously. We used the program ATLAS.ti to organize our field notes and interview transcriptions and help us recognize patterns in the data. Data were analyzed using a multistep coding process guided by the constant comparison method (see Strauss & Corbin, 1990). We began with open coding to identify all instances in the data broadly related to collaboration and coordination. That is, we coded every instance in our data that involved people working across departmental lines to accomplish or resolve some organizational issue. In successive stages of axial and selective coding we concentrated our efforts on data associated specifically with authority and collaboration, allowing us to examine subcategories and collapse them into broader topics. We identified key themes in the data based on their forcefulness, recurrence, and repetition. We continued this process in an iterative fashion, moving back and forth between field notes and coding schemes until we agreed on the critical incidents and four overarching themes that compose our case study. We incorporate ideas from the conceptual framework we developed above in order to explain our findings.

Theme 1: A Deficient Authoritative Text—"Wild-Wild West"

The story of the new PML facility begins with the problems and deficiencies of the old laboratory building. The original building began as a relatively small space to house a limited number of scientists and equipment. As NSC operations expanded throughout the 1990s and 2000s the original building received numerous additions and upgrades —piecemeal add-ons in response to immediate needs, but not in relation to any broader vision or organization-wide planning. The addition of more building space also brought new departments and projects that previously had been disconnected but now shared a common facility. The result was a puzzling arrangement of physical space and scientific units that was difficult to navigate and even harder to manage. Beyond the logistical hassles of a confusing layout, the old building also exposed bigger problems of collaboration that affected quality and safety. Even though scientists often worked individually on their projects and experiments they were dependent on building conditions (e.g., temperature, humidity, acoustics, etc.) and access to resources (e.g., electricity, processed water, clean air, etc.) that were beyond their control. To make things worse, scientists often took matters into their own hands because they did not trust that facility managers were capable of handling building operations at the level needed for individual experiments, and facility managers consequently implemented various controls that only further upset the scientists (e.g., access limits on certain rooms, restrictions on chemical or electricity use, etc.). Over time people began referring to this dynamic of individualism and mistrust as the "wild-wild west," a phrase commonly used to describe "how things worked" in the old building and throughout NSC.

All of this culminated in June of 2008 with a watershed incident that exemplified the coordination and collaboration problems at NSC: the plutonium spill in one of the lab spaces. And because the scientist involved did not know the appropriate response for plutonium spills he did not report the incident until days later. He also contaminated more of the facility by leaving the lab space and even threatened the city's water supply by washing his hands in a sink that drains to the municipal water system. Other scientists and maintenance workers were not even aware that plutonium was being used for experiments in that part of the lab. Subsequently the lab's radiation oversight committee issued a scathing report that placed most of the blame on the overall operation of the old building, not individual error. In particular, the report found that "the facilities to conduct the experiments were inadequate for this type of activity. They were overcrowded and poorly laid out." Additionally the report indicated "the work area was not restricted or controlled for radiological work and was in a busy, multi-use laboratory." This major safety incident embarrassed the lab and threatened much of its future funding and credibility within the broader federal laboratory system. The new PML facility would help overcome some of the material and logistical challenges of the old building, but there was much more emphasis on the fact that the scientists and building managers would have to "do things differently" regardless of their physical space. Thus, the transition to the new PML facility coincided with an equally ambitious effort to overcome the wild-wild west mentality that characterized much of the work among scientists and facility managers in the old building.

Accordingly, a first theme that emerged from our data involves this dynamic of wild-wild west and how it influenced collaboration—or lack thereof—at this laboratory. We suggest that wild-wild west can be understood as an *authoritative text* that emerged among scientists and facility managers in the old building. From repeated interactions around building conditions and resources, "wild-wild west" emerged as a figurative, yet authoritative representation of the work at NSC—figurative in that wild-wild west was not codified in any official documents or NSC materials, but authoritative because the concept of wild-wild west was very present in the work of NSC and had the capacity to influence organizational activities. One scientist named Steve explained the concept of wild-wild west this way: "It just means it's every man for himself, do what you gotta do to get your projects done and ensure the quality of your experiments. No one likes it, but we know that's how things work around here." As an authoritative text, wild-wild west basically "told" NSC workers how to act and provided a rationale to justify various decisions.

Admittedly, the concept of an authoritative text is difficult to operationalize in practice. Kuhn (2008) explains that authoritative texts can only be known through inferences about the discursive practices they bring about—they are revealed in networks of meanings that appear to be favored characteristics of organizational work. For us this was evident in how often NSC workers discussed wild-wild west as "how things worked around here" and how frequently this term was used as a shorthand reference for both the specific work in the old building and the broader mentality that they were striving to overcome. For example, in a meeting a scientist named Marcus

was asked to describe the current state of operations in his lab that was still in transition to the new PML facility. "The utility quarters are still wild-wild west on cleanliness and storage issues," he responded. In another meeting, one of the lab block representatives named Marsha stated her concern about storing surplus materials in the PML: "We don't want this turning into wild-wild west." In a conversation with a facility manager named William, he explained that a new lab door locking system was intended to prevent the wild-wild west practice of duct taping doors to keep them open. And in a meeting of galley space representatives, one of the galley safety representatives named Julian expressed her concern about electrical cords running across emergency showers as "reminiscent of the wild-wild west." These descriptions needed no further explanation because everyone knew what "wild-wild west" meant— it was a figurative text that people "read" the same way.

Although the textual abstraction of wild-wild west was authoritative, it was also deficient. This is because the *trajectory* of the wild-wild west authoritative text promoted a style of work that was contrary to preferred organizational goals and outcomes, especially for safety, quality, and efficient management of resources. Despite the formal regulations and protocols that defined how NSC operations were "supposed" to work, scientists' understandings of how things "actually" worked at NSC (i.e., wild-wild west) directed their efforts in ways that often thwarted collaboration. The trajectory of wild-wild west enabled individual scientists to connect and justify their actions in relation to the broader organizational narrative of individualism and mistrust: "This is what *I* need to do because of how things work around here," one scientist explained to us. Despite this deficiency, the example of wild-wild west shows how situated communication practices can gain distance from their original circumstances and emerge as an authoritative abstraction that has the capacity to affect collaboration, negatively in this case.

If "wild-wild west" was the problem, perhaps a "tougher sheriff" was the answer. The initial response to the plutonium incident and other problems at the old building was more rules and regulations—more specific instructions and protocols about how to monitor building conditions and manage resources. From 2008 to 2010 NSC experienced tremendous pressure from the federal laboratory headquarters to exercise more control through tougher regulations, rules, and procedures. Although this initially satisfied oversight committees, the press, and a concerned public, it did little to change actual working conditions at NSC. The novelty, scale, and complexity of work as NSC continued to thwart efforts to impose order solely through top-down protocols and procedures. As they prepared to move into the new PML facility in 2011 there was widespread recognition among NSC scientists and building managers that they needed to develop new ways of organizing and working together to achieve the level of collaboration needed for successful scientific research. From 2011 to 2013 the scientists and building managers developed a set of practices that brought more stability to the PML facility and helped improve working relationships, though everyone acknowledged that those achievements were fragile and much work still needed to be done. The three remaining themes demonstrate how NSC was able to develop a system of authority suitable for improved collaboration in the new PML facility while

simultaneously overcoming the existing authoritative text of wild-wild west that threatened to derail their collaborative efforts. We focus on the two key sites of collaboration we described above: the PML operations group and the laboratory galley spaces, both of which are central to the main collaboration issues for the PML facility (safety and material resources).

Theme 2: People, Not Just Protocols

As they began their work in 2011, one of the biggest challenges for the newly formed PML operations group was to resist the temptation to try to solve their safety and resource management problems by simply imposing more rules and regulations. Instead, they realized they had to interact in new ways to develop the legitimacy needed to act authoritatively in the new building. One issue that illustrates this is the creation of new "galley safety representatives" positions to help manage the service corridors between the various lab rooms. The service galleys are key sites of collaboration since they are shared among all the scientists in a particular lab block and because they are used to store and transport a substantial amount of materials and equipment. The majority of safety issues involve things that happen in the service galley areas. Initially the PML operations group thought they could improve safety and management of the service galley areas by designating them as formal "laboratory space," which at NSC meant they would be governed by a distinct set of rules and regulations that are particular to laboratories but not other "normal" spaces in the building. Although this did add more regulation and oversight it did not create the adaptive, responsive environment needed for proper management of the service galley areas. So in July of 2012, the PML operations group formally recommended to the NSC oversight committee that one person from each lab block be elected to serve as a galley safety representative, a new position created to enhance collaboration in the galley service areas. The six galley safety reps in the new PML facility were tasked with monitoring their respective galley service areas and coordinating with everyone who used that space. Galley safety reps were supposed to develop a rapport with those using their galley service areas, not just "police" the corridors. "We don't want cops and bad guys," explained one scientist at a PML operations meeting back in April 2012. At the same meeting the NSC director also expressed his hope for the galley safety reps to create "a good enough collaborative culture that these issues can be openly discussed and worked out."

NSC also implemented several other practices to increase the number of interactions among people in the new PML facility. At a lunch with some of the PML operations group the clean room manager, Allen, told us: "The [building personnel] have a different mindset than the scientists. They work hourly and clock out and don't come in on the weekends to fix stuff. But the scientists, this work is their life and they approach it differently." He went on to explain: "All these differences have led to rampant miscommunication between scientists and building personnel in the past,

causing a lot of the wild-wild west culture." Later Allen discussed how he was working to change this. He had been inviting many of the building personnel into the labs to meet with scientists and learn more about the work they do, something they never did before. By late 2012 he began making more of a concerted effort to socialize with the building personnel and build rapport with their staffs. Allen also told us about a similar approach he took with the purchasing agents who work with the building personnel:

> Often they bog down the process of buying necessary items, which really frustrates the scientists. So to win their favor … I've been inviting their department on tours of the clean room so they can get a better feel for what goes on in the labs.

All of these efforts throughout 2012 point to an important development in the new PML facility: the increase of interactions and informal conversations among different people at NSC. Essentially, they were writing a new script for how people should communicate, and we suggest this was a key part of establishing the necessary authority to improve collaboration. During our 2 years of observations at NSC we noticed an increasing tendency among the PML operations group to address various issues through relationships instead of more rules. Protocols and regulations were often the inevitable result of these interactions, but not the impetus. That is, additional rules and procedures were more likely to be the culmination of a relational process that was initiated and cultivated among key stakeholders, not imposed from upper management. Consequently, by 2013 the PML operations group and the galley safety reps started to realize an emerging authority that arose from their interactions throughout the laboratory facility and granted them the status of legitimate actors to marshal collaboration across domains of expertise.

Furthermore, these efforts simultaneously began to undermine the authoritative text of wild-wild west. We observed how often the PML operations group and the galley safety reps linked their critique of wild-wild west practices specifically to the "old building" instead of using wild-wild west to refer to all NSC routines more broadly. For example, during an April 2012 meeting, the facilities director explained the habit of scientists rigging the door locks as a wild-wild west practice from the old building; at a meeting in October 2012 one of the PML operations group members discussed the wild-wild west practice of how scientists used to fill their nitrogen tanks as an old building thing; and in a February 2013 discussion one of the PML operations group members talked with scientists and building managers about the wild-wild-west problem of inappropriate chemical storage as something characteristic of the old building. Essentially they were undoing the distancing that wild-wild west had gained over the years and returned this concept back to its source, thus helping to "un-write" the authority of this figurative text. A concept like wild-wild west can only become authoritative if it achieves abstraction by gaining distance (distanciation) from its original circumstances. These efforts challenged the idea that wild-wild west was an authoritative abstraction that characterized NSC operations, and instead conveyed that it was a more narrow understanding of particular work associated with outdated facilities and practices.

Theme 3: Creating Boundary Objects Through Labeling

Throughout the early 2000s one of the biggest problems in the old building was the substantial amount of resources and supplies that piled up in the hallways outside the lab rooms. Scientists want pristine, uncluttered lab spaces so they prefer to keep unused or surplus materials outside their labs. The problem is that eventually there ends up being too much stuff in the hallways and no one knows exactly what is in each container or how various materials are being used. This was widely acknowledged as leading to the plutonium incident in 2008 and a defining aspect of the wild-wild west approach that characterized the old building. Solving this problem was a key initiative for the galley safety reps and the PML operations group, and they knew it would require a collaborative solution because of the number of people involved. Yet they also knew that they could not just issue orders and directives about surplus materials because they did not have the authority to make people comply, nor did they have the capacity to monitor compliance throughout the laboratory all the time.

Instead, during the spring of 2012 they developed and implemented a new system to label all the important materials being stored in the galley service areas. The most vital of these materials were the cryogenic storage "dewars" or large containers used to store various gasses and chemicals necessary for experiments. The galley safety reps took on the responsibility of working with the scientists to convey the necessary information on the storage dewars in the service galleys, such as quantities, risks, and handling procedures of the gasses or chemicals inside. Initially the question was raised why the scientists could not do this labeling themselves. Two main reasons were given during a May 2012 PML operations meeting: one, past experience showed that scientists simply could not be counted on to follow these sorts of detailed procedures that were not directly related to their experiments; and two, even if scientists did provide what they thought was all the necessary information, they still did not know what was going on with various chemicals and gasses in other labs and how everything would interact. The value of having the galley safety reps responsible for labeling the storage dewars was that they were in contact with all the scientists in their lab block and had a more holistic understanding of all the work taking place in their part of the building. Plus, by volunteering to implement this new system, the galley safety reps (and by extension the PML operations group) was providing a valuable service that scientists and building managers did not want to do themselves, therefore enhancing their credibility as an authoritative presence in the laboratory.

Labeling things in the service galleys may seem trivial and inconsequential; at face value there is nothing particularly novel or innovative about this practice. However, understood within the context of large-scale scientific research at the NSC, this is actually a substantial and important development. As several people explained during our informal conversations, many scientists are conditioned through their education to see the enterprise of science as fairly private and individualistic, with an intense focus on one's own projects but limited awareness of other things going on around

them. Scientists had concentrated intensely on their workspaces but had less regard for anything happening outside their own labs. There was little sense of interdependence or integration, and people like the facility managers were viewed suspiciously as outsiders who did not understand or fully appreciate their scientific work. Hence, the willingness of scientists to implement and cooperate with a new labeling system was seen as significant progress.

Furthermore, we suggest labeling is a valuable practice that helps constitute material artifacts as boundary objects facilitating collaboration. In the old building things like storage dewars and crates were seen as surplus extensions of individual labs, with unknown contents and purposes. They signaled an encroachment into others' territory. But now dewars and crates have to be conceived and inventoried in a new, integrative way. Labeling transformed these artifacts into objects signaling the intersection of boundaries that define domains of expertise. A dewar that contained nitrogen, for example, was no longer just a container for "my" lab or "my" project, but also a container that could have a chemical reaction with nearby materials from other labs, or a container that has to be maneuvered around by building personnel when delivering materials for other labs, or a container with materials that could affect the dynamics of other areas of the building (e.g., temperature, humidity, acoustics, etc.). Now dewars were "read" differently—as textual representations that "made present" (presentified) the underlying authority of the galley safety reps and the PML operations group and signaled the collaborative nature of the physical space they occupy. The newly labeled dewars also made knowledge explicit and visible that was once tacit and private, further undermining the authoritative text of wild-wild west. Additionally, labeling was the result of a relational process where galley safety reps interacted with scientists and building personnel to determine what information should be included for each object. It was not the imposition of order from the outside, but rather an emergent stability that arose locally from those most closely associated with the service galley areas. Thus, labels as texts have a degree of agency to "tell" people what to do because they are seen as coming from a source of legitimate authority (i.e., the galley safety reps and the PML operations group).

Theme 4: Negotiating Material Resources

The final theme of our case study involves how the PML operations group decided to manage key resources used throughout the PML facility, such as helium, nitrogen, and clean dry air. We briefly describe one such resource and how the PML operations group developed a process of managing it in a manner that improved collaboration. A steady stream of processed chilled water is necessary for most labs to conduct a variety of experiments. From its inception in 2011 the PML operations group was tasked with ensuring the temperature, pressure, and cleanliness of the processed chilled water throughout the PML facility. If they did not accomplish this, scientists would resort to creating their own private loops in the system where they could manipulate their own water pressure and temperature with "chillers" in their individual labs. This was

problematic because it was reminiscent of the wild-wild west individualism that characterized their previous work. And with 68 separate labs using processed chilled water the PML could not afford or manage that many separate chiller units.

The original specs for the processed chilled water system did not achieve the correct temperature, pressure, and cleanliness necessary for all lab experiments. However, throughout 2012 PML members took the time to meet with lab block representatives, learn how they were using processed chilled water, and adjust the levels until they reached the right balance of temperature and pressure—a level of cooperation that was not characteristic of previous NSC work. They also devised a new plan to install water filters in each lab rather than using a system-wide filter, which was not achieving the desired level of water purity. At a November 2012 PML meeting one of the scientists reported that "processed chilled water was a success story" for the PML because they were able to accomplish a facility-wide solution that prevented individual labs from taking matters into their own hands. It demonstrated the operation group's ability to be responsive to lab-level concerns and prevent wild-wild west responses, thereby increasing their trustworthiness and enhancing their authority to coordinate work in the new facility. Additionally, this helped to further erase the authority of the wild-wild west mentality because it showed that submitting to an alternative source of authority was a more effective way for scientists to manage their resources.

DISCUSSION

The purpose of our study was to explore the issue of authority in collaborative work, both in terms of how authority is established apart from hierarchical mechanisms of control and how existing forms of authority are overcome and transformed. Our case study demonstrates how this organization was able to achieve a notable level of collaboration that was awarded by the federal laboratory system, yet in an environment known previously for the lack of collaboration and involvement with a major safety incident. The key insight from our research is that authority in collaboration involves both authoring and de-authoring, as people create new systems of influence and accountability while simultaneously erasing prior authoritative forces that undermine collaborative work.

Accordingly, our work makes a number of contributions. First, it adds further empirical support to the idea that authority in collaborative work is a negotiated phenomenon that is worked out in practice among organizational members, resulting in more emergent forms of influence that can transcend boundaries and hierarchies. Because of the complexity and novelty of work in the PML facility, they were not able to achieve collaboration solely through rules and protocols. Instead, they engaged in a number of new practices that afforded the operations group and the galley safety reps a level of authority and legitimacy necessary for collaboration, similar to what Suchman (1994) calls the "artful integrations" required to coordinate across boundaries. This emergent order is not an objective feature of collaboration, but is negotiated in

practice as members continually recreate the integrating conditions of their coordination (Jarzabkowski et al., 2012; Okhuysen & Bechky, 2009).

Additionally, our research contributes to CCO theorizing, which explains authority as a process of authoring where people write an official version of the organization that conveys specific notions of purpose, direction, and identity—conceptualized as an authoritative text. The connections between authority and authoring are well-established in the CCO literature (e.g., Benoit-Barné & Cooren, 2009; Kuhn, 2008; Taylor & Van Every, 2011, 2014); our contribution is to extend this line of thinking to the important context of collaboration, and foreground the notion of de-authoring as a key aspect of accomplishing authority in collaborative work. A key question is what do people "read" in moments of ambiguity and uncertainty as they negotiate the difficulties of collaborative work. Authority-as-authorship can be enacted and "made present" in interaction, but not reduced to rational-legal forms of power derived from position, which we saw with both the PML operations group and the galley safety reps. Collaboration is not just about establishing authority, but also overcoming or transforming existing authoritative influences. If texts achieve authoritative status through distanciation and the "vanishing" (Taylor & Van Every, 2011) of specific authors, then overcoming this authority would involve recontextualizing an authoritative text back to its original circumstances, thus eliminating the abstraction that enabled it to enshrine authority through space and time. Over time NSC members de-authored the authoritative text of wild-wild west by continually linking it back to the particular site of the old laboratory building and specific practices associated with that facility, thus removing much of the abstraction wild-wild west had developed and preventing it from being "read" as a valid representation of the work at NSC. Accordingly, we suggest that the de-authoring of authoritative text is important for understanding the successful collaboration at NSC. Not only did they facilitate the emergence of a new system of authority, their efforts simultaneously de-authored the authoritative text of wild-wild west that threatened their collaborative goals. In their review of the CCO literature Taylor and Van Every (2014) claim that no previous research focuses on erasing or un-writing authoritative texts, and they call for future studies to investigate these issues. Our work responds to this call and offers an initial example of de-authoring to inform subsequent research.

Despite these contributions, our work does have limitations. First, this study is limited by its focus on a single case study. Case study research necessarily emphasizes depth over breadth, which means extending these findings to other contexts should be done cautiously. Certainly much can be learned from "samples of one" (March, Sproull, & Tamuz, 2003) and case studies provide valuable insights to inform future research (Yin, 2009), but single case studies do present a narrow view of the phenomena under investigation. One way to overcome this limitation is through multiple or comparative case study research. Having established initial concepts and findings in this study, future research should explore the notion of authoring and de-authoring authoritative texts across a number of contexts involving collaborative work. Second, this study is limited by the type and amount of data that informed our analysis.

Although we had considerable access over an extensive period of time, we still only captured a fraction of the interactions and accounts that might be relevant for understanding authority and collaborative work. This limitation can be addressed in future studies through a variety of novel methodological practices that are becoming more common in case study research, including shadowing (Barley, Leonardi, & Bailey, 2012), unobtrusive video-recording (e.g., Benoit-Barné & Cooren, 2009), and video-simulated recall interviews (Thorpe & Holt, 2008). We did not have permission to use any of these techniques in our investigation, but future research designs should consider a broader repertoire of procedures that will enhance the quality of data collected and expand the insights that can be gained from a particular research site.

Note

1. All organizations and names in this study are pseudonyms

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