

Developing New Materialist Research Frameworks for Collaborative Response

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Abstract

The recent HIV outbreak in Scott County, Indiana demonstrates how complex socio-technical problems strain current conceptions of public problem solving, and how practitioners, including technical communication researchers, need new tools and methods that both address immediate needs and support sustained responses to complex problems. Well-deserved contemporary attention to new materialist frameworks for research (McNeely, Teston, & Spinuzzi, 2015) illustrates the need for methods that address the complexities of technical communication. The Scott County outbreak, and the trajectory of needle exchange policies that emerged in its aftermath, show how attention to visible infrastructure (Star, 1999) creates opportunities for sustained, collaborative responses to these and other socio-technical problems. By integrating multiple kinds of expertise and embracing the complexities of working across disciplinary and community boundaries where language, methods, and expected outcomes may differ, technical communicators can better cooperate to address public problems by developing responses which speak to the underlying inequalities frequently associated with them.

Drawing on new materialist theories such as *diffraction* and *intra-activity* (Barad, 2009), and the agentic capacity of infrastructure (Bennett, 2005), the author identifies frameworks for research calibrated to the messiness of wicked problems. She uses public documents such as press releases and health department guidelines to develop a case study tracing the trajectories of needle exchange policies in Indiana as they move from situated decision-making and emergency response to statewide policy. Using the same public documents the author uses situated analysis and new materialist theory to map the visible themes, shifts, and decision making practices of multiple stakeholders. The results of this qualitative analysis are then used to interview public health practitioners and scholars in related fields to consider differences in language, discursive practice, and methods for operationalizing knowledge. Rather than describing technical communication as a bridge between stakeholders, mapping the entanglement of methods for practice and research across disciplinary and institutional

boundaries makes visible the embedded work of technical communication. Research practices that work to keep this infrastructure visible will help technical communicators better collaborate for responses to the multiple exigences of complex problems.

Problem Statement

In the recent special edition of *Technical Communication Quarterly*, focused on contemporary research methods, the editors (McNely, Spinuzzi, & Teston 2015) bring attention to the continued need for innovative technical communication research, and point to new materialist theory as productive ground for developing methodological frameworks. The editors speak to decades of evolving methods which show how conditions for doing technical communication have changed since the last methods-focused issue in 1998. The editors argue that the tools, technology, work spaces and practices of technical communication have changed in ways that require new methods. Added to these concerns are the evolving social, environmental, and political disruptions which seemed unimaginable even a decade ago. This issue shows how a turn toward action research, participatory design, visual methods and data analysis allows for (or demands) mixed-methods approaches that expand on more traditional qualitative methods technical communication research.

New materialist approaches expand on the critical turn in technical communication which addresses the historical consequences of technical communication conceived as a neutral, invisible bridge for information transfer. New materialist methods are driven by network theory, especially as set forth by Bruno Latour and successfully deployed by technical communication scholars (Spinuzzi, 2003; Gries 2013); by a commitment to feminist methodologies (Grosz, 2010; Alaimo and Heckman 2008; Haraway 1985); and by interest in the complex nature of distributed systems and emergent phenomena (King, 2011; Bennett, 2010; Barad, 2007). New materialist theory allows researchers to trace technical communication practices across sites that include the professional, institutional, governmental, and civilian without separating those

practices from the complex human-nonhuman assemblages in which technical communication is entangled.

Critical approaches to technical communication research make clear the extent to which the infrastructure of technical communication is implicated in systemic inequality (Longo, 2000). Technical communication researchers must respond to a multiplicity of ruptures that demonstrate how technical communication fails as a transparent medium for sharing information. Wicked problems (Blythe, Grabill & Riley 2008) multiply more quickly than any industry, municipality, or state can respond. The extent to which technology and scientific discovery, and therefore technical communication are ubiquitous can't be underestimated. Callon, Lascoumes, and Barthe (2009) challenge that our current infrastructures are simply not capable of absorbing the number of ruptures created by the Anthropocene. "It is no good treating each issue separately, as if it is always a case of exceptional events. . . these debates are becoming the rule. Everywhere science and technology overflow the bounds of existing frameworks" (p. 9). Callon et al. call for collective action and a commitment to participatory experimentation and learning, including both experts and non-experts in deliberative processes. Action research in technical communication such as Blythe et al. and new materialist theory demonstrate the extent to which technology and scientific discovery are therefore technical communication are ubiquitous and cannot be underestimated.

Coole and Frost (2010) further demonstrate how critical technical communication research must employ complex methods to address problems. in their introduction to a collection on new materialisms, they illustrate how our ontological frames for political understanding and public problem solving continue to outstretch current methods for collective action:

It is becoming evident that changes in living matter are rendering obsolete many of the ethical categories used to evaluate them . . . the boundar[ies] between life and death are currently becoming further enmeshed with issues surrounding sovereignty because increasingly the state must legislate on matters that were formerly left to God or

nature...nature is no longer a reliable guide to the difference between life and death.

Instead the distinction becomes a scientific, medical, and ethicopolitical question. (p. 22-23)

Coole and Frost address the relationship between biotechnological questions and political questions, but the exigency here can be abstracted to fit alongside others reaching for new ways to respond to socio-technical problems that were previously unimaginable. The current rate of change we are experiencing and that must be understood among multiple stakeholders for decision making and response continually overflows existing frameworks. If we take the responsibility of critical scholarship seriously, technical communication researchers and practitioners must acknowledge our role as members of a wider community working to respond to problems, then do the best work we can to address those problems effectively. Collaborative research is performance oriented, focused on how our communities design processes, strategies, and modes of communication that address immediate needs.

Historically, technical communication has been called upon to fill a gap between what scientists and experts discover about the world and how we make sense of those discoveries as part of our lived experience. In some ways, we are served by a narrative that positions technical communicators as the mediators between multiple stakeholders. But in other ways, as we try to imagine what technical communication looks like in terms of twenty first century problems and practices, attempting to work between stakeholders creates false barriers, and limits innovative strategies for research and application. To borrow from service-learning pedagogy, to imagine technical communication as working in between stakeholders is to take a “writing about” approach to the relationship between technical communicators, the information they communicate, and the complex problems they work to address. Describing technical communication as a transparent bridge perpetuates the idea that communication itself is valueless and objective when we know this is not the case. I argue that the growing call for research and practice grounded in new materialist theory conceives of technical communication

that operates less in terms of mediating *between* stakeholders and more in terms of interdisciplinary collaboration *within* complex ecologies of distributed knowledge.

The Emergence of Needle Exchange Law in Indiana: A Representative Example

The recent HIV outbreak in Scott County, Indiana illustrates how complex socio-technical problems overflow the boundaries of our existing frameworks, and how professionals, like technical communication researchers, must reach for more critical and complex methods for addressing problems. In February of 2015, the Indiana State Department of Health (ISDH) announced they were tracking a quickly spreading outbreak of IV-drug related HIV in Southeastern Indiana. Since the initial announcement, 227 cases of HIV have been diagnosed in Scott County, IN (in.gov, 2017). Nearly all the cases have been tied to a decades long problem of opiate addiction in the rural community. A network of state health care workers, social workers, CDC researchers and epidemiologists, as well as state, local, and federal government officials have been engaged in not only stemming the outbreak but attempting to plan for the realities of long term health care for those infected.

This multiplicity of practitioners must address other problems embedded in the outbreak while working in a community deeply affected by poverty and struggling to deal with drug addiction with few local resources for addressing either the problems or their consequences. Alongside these professionals, and sometimes operating in opposition to them, are the newly diagnosed HIV patients, their families, friends, and allies; local church groups, non-profits, and others whose focus is the community at large; individual citizens concerned about infection rates, the safety of their children, and the suddenly visible opiate epidemic at the center of this outbreak; and many more individuals and groups. All of these stakeholders have different concerns, different levels of knowledge, and access to different kinds of information. Through this entangled but often still disconnected network, both formal and informal working groups make decisions, perform daily operations, and implement policy across distributed agencies,

groups, and contingencies. These complex, often competing work groups rely on communication, often highly specialized communication, in order to respond to the immediate needs of the community. In this network, ways of working and mechanisms for response emerge and are put to use. I am interested in the roles of technical communication as these emergent capacities for response develop.

Because of the scale of the outbreak, and because then-Indiana governor Mike Pence made the controversial choice to authorize an emergency needle exchange in Scott County, the problem captured national media attention at the time of the outbreak, and with several Indiana needle exchanges still in flux, remains in the news. In the national media, as in the community itself, the causes, the public health response, and the aftermath take on multiple meanings, definitions, and exigencies. The Scott County outbreak, and others like it, are *wicked problems* because as Horst Rittel and Melvin M. Webber (1973) originally used the term, they are policy and planning problems where there is no answer, no one solution, and every problem can be considered a symptom of another problem. Wicked problems are “never solved. At best they are only re-solved over and over again” (160). Public problems like disease outbreak, drug abuse, climate change, economic shifts, and policy planning aren’t only scientific problems, Rittel and Webber contend. This holds true, and is emphasized by both Latour and Callon et al. In their questions about the value of laboratory methods for responding to 21st century socio-technical problems. While problems like stemming an HIV outbreak are deeply embedded in how we understand science and medicine, the multiplicity of definitions, motivations, stakeholders and potential outcomes make it difficult to communicate technical, political and institutional understanding of the problem across fields of expertise. Finding ways for these groups to cooperate for viable solutions that include all members of the community requires those groups to invent new capacities for response.

Needle exchange programs like the Scott County exchange I highlight here have a long history deeply entwined with public responses to both drug use and the spread of diseases like

Hepatitis-C (HCV), HIV and AIDS. These programs first developed in the early 1980s in the Netherlands in order to respond to drug use in a manner which prioritized *harm reduction* rather than criminalization. Dutch researchers and policy makers decided that a public health approach responding to problems related with IV-drug use, namely the spread of Hepatitis and other blood borne illnesses through needle sharing, would be more effective than policing or treatment programs alone. Debates about the efficacy of the competing philosophies of *supply reduction* or criminalization of drugs and drug users, and the public health response known as harm reduction has always been entangled with the HIV/AIDS epidemic that spread across Europe and the United States (Inciardi and Harrison, 2000). Policy makers that support harm reduction cite multiple studies that show the efficacy of needle exchange programs in reducing infection rates for hepatitis and HIV. A recent (2009) comprehensive review of international research regarding the efficacy of needle exchange programs found “compelling evidence that increasing the availability, accessibility, and both the awareness of the imperative to avoid HIV and utilization of sterile injecting equipment by [injection drug users] reduces HIV infection substantially” (Wodak and Cooney, p. 802). A review of 45 international studies over 25 years confirms needle exchange efficacy as an ongoing concern, however those opposed to needle exchanges for ideological reasons are in general unconcerned with the results of clinical assessment.

Despite compelling empirical evidence that harm reduction approaches generally, and needle exchange programs specifically, reduce the spread of infection, the United States has been slow to adopt needle exchange, even in the height of the AIDS epidemic at the end of the twentieth century. Opponents tend to take a “zero tolerance” approach to drug use that focuses on supply reduction and criminalization. While opponents tend to be unswayed by empirical evidence that shows efficacy of harm reduction programs, they are often quick to cite some early Canadian studies that showed a higher incidence of HIV among drug users that utilized needle exchanges (Bruneau, J., Lamothe, F., Franco, E., Lachance, N., Désy, M., Soto, J., & Vincelette,

J., 1997; Strathdee, S.A. et al., 1997). The conflicting ideologies of harm reduction and zero tolerance/criminalization, have continued to play out in public policy debates, and are receiving new attention as the opioid epidemic and an increasingly partisan political landscape make responding to the rising complications of IV-drug use visible in communities across the country even more difficult. As I write this, a federal funding ban on needle exchange programs remains in place, despite President Trump's recent statements about the opioid epidemic being a "public health emergency" (Davis, 2017, October 26). As Indiana moves beyond its initial response to the HIV outbreak that eventually led to a needle exchange law in Indiana, the conflicts between harm reduction and ideological opposition to "enabling drug use" continue to complicate responses to rising infection rates of Hepatitis-C in several counties. Hepatitis, and other blood borne infections are considered a risk factor for increased instances of HIV infection. While needle exchange was seen as a viable, though not uncontested, response to the outbreak in Scott County, as needle exchange programs have spread to other Indiana counties, implementation has been uneven and opposition is growing in some counties. In October 2017, county councils in two Indiana counties that initially authorized needle exchanges voted to defund those exchanges over moral objections to "enabling addicts" and "facilitating illicit drug use" (Hedger, 2017). Public health workers in other counties including Tippecanoe County, which recently started its own needle exchange, are facing these same pressures. The need to show efficacy and compliance while empirical evidence of success is often overwhelmed by a public sentiment of moral outrage and a fear of increased criminal behavior. This skepticism is reflected in journalism about needle exchange, which tends to feature a mix of voices: public health workers, CDC experts, local law enforcement, community members, and sometimes the addicts themselves. Included in this mix of voices are the procedures, policies, the needles and the viruses themselves, all of which also speak as part of this assemblage where methods for policy implementation and response are often unclear and contested. The complexity of needle exchange policy, and the tangled problems such policies address, requires a research

methodology that takes into account this multiplicity of actors, including non-human actors, and while this type of research isn't new to the field, I join others who are looking for new ways to think about effective methods. This leaves some space for uncertainty and exploration as I collect data and consider how theory and practice inform my ways of seeing.

My project aspires to identify possible methods for long term, interdisciplinary response to complex problems by first developing a case study that examines media accounts and official public documents related to the Scott County outbreak and the statewide needle exchange law that emerged in response. Indiana Senate Bill 461, passed in June 2015, made permanent the temporary needle exchange authorizations Governor Pence approved for Scott County, and created a mechanism for other county health departments to apply for needle exchange authorizations. Between 2015 and 2017, eight counties have been approved for needle exchanges. Sixteen more counties are currently considering needle exchanges, and House Bill 1438 (August 2017) makes it possible for counties to authorize needle exchanges without the approval of the state.

The Scott County outbreak is thus a promising site for conceptualizing a new materialist framework for technical communication research for two reasons:

- 1) It is representative of the deeply entangled problems that new materialist and technical communication scholars have taken up as a pressing area for research where new methods for responding to technical, social, political and environmental concerns are required.
- 2) Crisis makes visible the embedded, often invisible infrastructure through which technical communication and professional practice operates.

What Contribution Does My Research Make to the Field

My research takes up the recent call for new materialist methodologies in technical communication by focusing on the agentive capacity of infrastructure (Bennett, 2005) without

bracketing the messiness of complex problems and cooperative work. Because infrastructure is most visible when it's broken (Star, 1999, 2010), the agentive capacity of community infrastructure is most visible in response to crisis or overspill as described by Callon et al. But this doesn't mean crises make studying emergence easier: any response to crisis is difficult because the work of assembled agents, which might include practitioners, but also includes other human and non-human actors, is rhizomatic and irregular. More importantly, first responses are almost always concerned, in those moments, not with knowledge making, but with accounting for and responding to the immediate needs of people in neighborhoods disrupted by the slow creep of drug abuse and chronic disease—or for that matter the immediate changes wrought by natural disasters.

What makes studying crisis difficult is also what makes this research significant to how we conceptualize the work of technical communication in multiple contexts. Work of all kinds develops emergent practices in response to complex problems. These practices address immediate needs rather than attending to the formation and maintenance of underlying infrastructure. This is important for how we think about the intersections of rhetoric, public problem solving and technical communication, especially when we consider the myriad of wicked problems that populate our news feeds today: access to healthcare, poverty, systemic discrimination, the complications of disaster response and climate change, and also the smaller, more immediate concerns of decision making in local communities and funding in our university departments. These are all different problems, but they represent sites for considering the intersections of technical communication and public problem solving. The work of sensemaking and response, often a project of technical communication, seem to be happening as a constant engagement with breakdowns in infrastructure. These complex intersections of embodiment, technology, community, and bureaucracy are the kind of techno-social complexities new materialist theorists, and technical communication researchers interested in new materialist methods, are attempting to understand. Cooperation to address complex

problems is about technical communication, but not only about technical communication. These problems are interdisciplinary and call for attention to the infrastructures that emerge in order to support collaborative response. I am interested in mapping the assembled respondents, human and non-human, expert and non-expert, in order to consider what a sustained, collaborative response to such problems might look like. I hope my research will help scholars and practitioners work more closely and communicate more effectively with more interdisciplinary audiences, furthering and contributing to the ongoing commitment to critical scholarship that actively builds better communities.

Research Questions

1. How do needle exchange laws and needle exchange policy implementations in Indiana work as a boundary object?
2. As boundary objects are stratified into processes and policies, which stakeholders are silenced or elided? What evidence of new boundary object formation or evolution can be seen by tracing Indiana needle exchanges as assemblages with emergent capacities?
3. What methods make visible the tacking back and forth between tacit practices that allow for cooperation without consensus, and the stratification of policies without framing out the messiness of complex problems?
4. How can my research help develop frameworks for ongoing, collaborative research which allow technical communication researchers and practitioners to participate in interdisciplinary responses to complex problems?

Praxis Grounded in New Materialist Theory

I see a strong connection between new materialist theory and our current political moment. And I see resonances between new materialist perspective and the role of technical communication in public scholarship. Ellen Cushman (1999) talked about the role of the public

intellectual as not only making scholarship more public and more accessible, but also in terms of doing our work, our research in and amidst others in order to respond to public problems. New materialist theory continues the postmodern commitment to rethinking subject object binaries in order to consider more complex conceptions of ontology and epistemology. In order to engage the incredibly messy, complex problems we seem to encounter on a frequent, and increasingly dire basis, we need to consider the messiness of theory in practice. My interests in new materialism, its plurality of ideas and perspectives has emerged alongside the phenomenon of the Scott County outbreak. Making sense of the response to the outbreak has informed how I am beginning to articulate a new materialist methodology for interdisciplinary research in technical communication. I think of the theory as grounding a vocabulary for what I see in the data, and also for situating this research in terms of aims and point of view. New materialist theory, as I employ it in this project, begins with the idea that a response to complex problems is both required, and situated in rhetorical invention and ethical praxis. Diane Davis describes this, in part, as a judgement that “aims for justice.” She says, “Judgement with an eye to justice could have no illusions of finality or universality ... A judgement aiming for justice would necessarily take place as a tentative gesture, offering itself without clarity or certitude, both as test and invitation” (2010, p. 127). I embrace the inventive nature of new materialist theory, including its commitment to extending the feminist materialist approaches that preceded the “new materialist” label.

New materialisms, at least as they interest me, continue and contribute to feminist methodologies based in a commitment to social justice. Coole and Frost (2010) describe a critical new material perspective as one that, like feminist and class theory, accounts for bodies in relation to the socioeconomic systems and material environments in which they are embedded (p. 19). At the same time, new materialism critiques of how we conduct research that responds to bodies embedded and imbricated in systems of power; new materialisms call for more empirical, phenomenological attention to “corporeality as a practical and efficacious series

of emergent capacities” (p. 20) that affect and are affected by human and non-human actors. Critical new materialism is an orientation to political action that “calls for a detailed phenomenology of diverse lives as they are actually lived—often in ways that are at odds with abstract normative theories or official ideologies” (p. 27). The complexity of the current opioid epidemic as a symptom of the entangled concerns that include, but are not limited to: modern pharmaceutical development, poverty, shifts in energy policy, and access to healthcare require us to think of response not only as responding to the human bodies impacted by the crisis, but by those bodies in the midst of an assemblage for which “normative theories and official ideologies” have no existing capacities for response. The problems overflow the boundaries of our current ways of being and knowing in the world.

As I examine the Scott County HIV outbreak, I’m aware of my cultural-linguistic training when I research news reports and public documents. The ways that actors are named certainly makes possible the ways those actors are seen in the world. At the same time, I want to articulate a methodology that will allow me to examine the response to the outbreak as a material phenomenon, not only as a way to understand this event, but in a way that might allow for this event to frame methods for collaborative research. While I expect to further refine the new materialist theory, including the terms, methods and approaches as I collect data and develop my initial case study, there are three theorists whose thinking informs my initial questions and approach:

- Susan Leigh Star: The characteristics of infrastructure and the movement of boundary objects.
- Jane Bennett: The agentive capacity of the assemblage.
- Karen Barad: Diffraction and Intra-activity. Ethico-onto-epistemology.

I’m interested in how theory informs methods, particularly in how new materialist theory makes explicit connections between our apparatus, our ways of making knowledge and what is made real, made possible. Barad describes this as *ethico-onto-epistemology*, meaning that we are

responsible for **being** and **making known** simultaneously. Because I take seriously the ethical charge laid out in social justice approaches to critical research, and I see that same commitment to ethics as material concern, I am interested in doing the difficult work of articulating methods for new materialist praxis. The theoretical framework I'm building begins with terms and concepts that have emerged in my reading and research alongside my initial research and reading of the Scott County case. While I'm still exploring the specific ways that new materialist thinkers will inform my methods, data, and conclusions, reading collected data as entangled with these theoretical concepts should allow me to make more concrete decisions about methodology while simultaneously exploring the implications for interdisciplinary work between new materialist theory and methods for research in technical communication. I end this section with a list of questions arising from the connections I'm making here. These questions will inform my data collection and analysis, and help me further refine my research questions and research design.

Characteristics of Infrastructure and the movement of boundary objects

In "Ethnography of Infrastructure" (1999), Star named nine characteristics of infrastructure that can make visible the networks, practices, procedures and tacit agreements that underpin collaborative work. Two of these characteristics are important to establishing new materialist methods for studying emergent infrastructure in response to crisis. According to Star, infrastructure is:

- 1) "Visible upon breakdown"
- 2) "Big, layered, and complex, and because it means different things locally it is never changed from above...Nobody is really in charge of infrastructure" (p. 382).

The first point, that breakdown makes infrastructure visible, might seem too obvious, but it is key to making visible the interdisciplinary boundaries, varied expertise, and multi-faceted relationships necessary for collaborative response. While living in a state of crisis response isn't

ideal, it is often how we go about work. The second point, that infrastructure is situated, distributed across networks with competing definitions and use-cases and is therefore changed incrementally rather than globally is well understood in technical communication research, but the consequences of that distribution—that no one is in charge of infrastructure—is challenged by the critical turn in technical communication and in turn extended by the current focus on new materialist methods. Infrastructure, seen as impenetrable bureaucracy or monolithic institution allows for critique, but not action. In contrast, when researchers attend to local problems and imagine situated rather than universal responses, they can more fully engage in cooperative interventions to affect underlying infrastructure and create space for better ways of working (Porter, Sullivan, Blythe, Grabill, & Miles 2000).

Star describes one condition of boundary object formation as the capacity for “groups that are cooperating without consensus [to] *tack back and forth* [emphasis added] between forms of the object” (p. 605). The *tacking back and forth* Star describes is not about taking up one conception of the object over another, but rather is concerned with tracing the movements between the ill-structured, vague, tacit processes that allow for cooperation and the tailored, more specialized or codified standards and infrastructures that make objects useful to some groups and not useful or exclusionary to others. (Reading boundary objects as processes and agreements, or for my purposes assemblages, is important in this discussion.) To put this in more concrete terms, examining this tacking back and forth of objects (assemblages) in the “working groups” that must cooperate to respond to problems is an ontological project that includes a multiplicity of actors, including non-human actors. These assemblages of actors determine the reality in which boundary objects, as a set of work arrangements that are at once material and processual, emerge, are maintained, are stratified into systems and infrastructures that then require the formation of new boundary objects. I am interested in both the formation and the stratification of emergent infrastructure, and how tracing this tacking

back and forth informs our understanding of how to more deliberately and ethically respond to a multiplicity of evolving, entangled, complex problems.

The formation of new boundary objects is required when some members of cooperative groups are excluded through the specialization and standardization of objects and therefore must form new processes that allow for cooperative work without consensus. For example, while the Governor authorized the emergency needle exchange in Scott County, and that authorization came with official guidelines for implementation, it is clear from my initial research that the needle exchange as a boundary object was in a constant state of negotiation between practitioners, addicts, and members of the community. How the exchange would operate, the services it would include, what would be considered as successful, or acceptable was a series of processes, negotiations, and public conversations which are evident in my initial examination of press releases and news stories.

Star concludes her reflection on boundary object research by challenging researchers to develop better methods for capturing the aspects of object formation, “including the nature of the back and forth between ill-structured and well structured; the architecture of the infrastructures involved, and especially within and from those inhabiting residual categories and how they form new boundary objects” (p. 614). My dissertation positions the HIV outbreak in Indiana, and the resulting emergence of needle exchange law, as a case in which to trace the tacking back and forth of boundary objects. I will map and find language for the shifts between ill-structured response and well-structured policy in order to explore and clarify a framework for interdisciplinary collaboration and cooperative work.

Agentive Capacity of Infrastructure

Star’s conception of infrastructure makes clear its layered nature, its tendency toward inertia, and its positioning of human capacities to affect incremental change within distributed networks. Bennett, on the other hand, works to de-center our human capacities in order to make

clear the ways that distributed networks and the infrastructures that support these networks are also potential actants with *agentive capacity*. Bennett is troubled by the limitations of an epistemology that only sees humans as actors with agency. She highlights the problem of an epistemology that names “structures, surroundings, contexts and environments [as] background settings rather than spirited actants” (2005, p. 455). An exclusively human-centered agency wrongly limits our perception and the possible sites for political intervention. Bennett describes agentive capacity as the ways assemblages can “not only to impede or block the will and designs of humans but also to act as quasi agents or forces with trajectories, propensities, or tendencies of their own” (2009, p. viii).

Bennett uses the example of the 2003 North American Blackout to describe the capacity of the cascade to “speak” and act in ways that required experts, politicians, and communities to consider the power grid differently—to consider its actions and responses when making operational and political decisions. This conception of response including non-human actors in working groups speaks to Star’s conception of boundary objects neither as concrete objects nor groups of individuals, but as assemblages of processes and agreements. This capacity for things to “speak and act,” to “locate agency [in a] human-nonhuman working group connects with what Carolyn Rude (2009) has described as the central question of technical communication: “How do texts and related communication practices mediate knowledge, values and actions in a variety of social and professional contexts?” (p. 176). As I consider the relationship between Star and Bennett, and particularly Star’s call for more attention to the movement of boundary objects, I want to pressure this action-oriented language of technical communication that researchers and teachers we tend to empty of its agentive capacity.

Texts mediate knowledge, values, and action. This is clear in Scott County, given that health department reports and Indiana State Department of Health policy documents operationalize responses and create and/or explicate what is possible for practitioners and agencies in their interactions with the community. The approach to better understanding these

complex mediations goes far beyond simply tracing the pathways of the policy documents, how they evolve, who contributes, and who is silenced or made invisible as first responses to stem the outbreak transform into policy response. Bennett's work demonstrates the necessity and difficulty of framing out the complex working group—the human-nonhuman assemblage in which these documents function—with the goal of identifying the power imbalances and inequalities a simplistic theory of mediation can erase. Considering the agency of the assemblage is one way to expose how treating technical communication as a bridge between groups limits the possibilities for collaborative material, political, and social responses to complex problems like drug abuse and addiction. In other words, because mediation in technical communication has signified at best neutrality and at worst invisibility and control, more critical approaches must enliven mediation as a verb, helping technical communicators and the texts we produce become more accountable for our participation in assembled working groups. Technical communication doesn't only exist between stakeholders, it is also the media, the stuff in which we are entangled (Peters, 2015). Continuing to unpack the relationships between conceptualizations of infrastructure as embedded and also agentive will be necessary as I investigate and document the “tacking back and forth” moves of boundary objects in working groups responding to the Indiana opioid crisis.

Diffraction and Intra-action as methodological foundation

Karen Barad (2007), drawing both on her knowledge of quantum physics and the frameworks of postmodern and feminist theory, argues for an interdisciplinary “diffractive methodology” which moves beyond “mere acknowledgement that both material and discursive, and natural and cultural, factors play a role in knowledge production by examining how these factors work together” (p. 25). Diffractive methodology, according to Barad, is a commitment to accounting for differences that matter. When Barad uses the term “matter,” she isn't speaking simply of importance or weight, but “mattering” as a verb: “The point is not merely that

knowledge practices have material consequences, but that *practices of knowing are specific material engagements that participate in (re)configuring the world*” (p. 91). As we design research methods, we are not only choosing ways of understanding the phenomena we study, but we are, through our work, making the world in particular ways, and contributing to the conditions for emergent phenomena. Longo (2009) echoes this idea in terms of a cultural studies approach to technical communication. A study “imposes ordering on the object and its contents, thereby including some ways of understanding the object and excluding others...a cultural study of technical writing would explore the silences, absences and exclusions still held within the dominant knowledge and discourse of that field’s practices” (p. 126).

Dominant knowledge practices are often invisible, particularly in specialized discourse communities of skilled practice. In fact, as Longo’s research demonstrates, keeping those knowledge practices invisible in order to maintain systems of control has historically been a hallmark of technical communication. “Good technical writing is so clear that it is invisible” (Longo, p. 111). In other words, good technical writing taps into the tacit knowledge of a community such that it can “fit into the existing web of tacit knowledge, workflow and work tools” (Spinuzzi, p. 166). Barad’s conception of intra-activity shows the problem with seeing technical communication as invisible, as if the apparatus doesn’t affect what is possible. Considering what technical communication makes visible (or invisible) in a given situation is to as Barad says, be accountable for the “marks on bodies” left by the apparatus we use to carry out activities (p. 174) Our goal then as researchers should be to work with others to identify the tacit knowledge, the ways of ordering objects within frameworks that matter—that make the world in particular ways—with attention to the gaps, breakdowns, silences and exclusions within those frameworks that when, made visible, can expose capacities for cooperation and collaborative response.

Developing New Materialist Methods

One of the problems for this approach to empirical research is the extent to which the differences that matter—the capacities for change—are emergent from rather than prescribed by our practices. This is an approach where mixed methods are required. It is an approach that is question rather than hypothesis driven. It is also an approach that must always be cognizant of how, as our research practices order objects and make visible tacit knowledge, we have already affected change by changing what can be seen, named and documented. (Star & Strauss, 1999; Bower & Star, 1999). This methodology emphasizes the extent to which our research practices are at the heart of what we do as technical communicators if we are willing to see our work not as a bridge between experts and non-experts, but as a circulatory system through which we build a collective world. This isn't intended to be poetic. Thinking through how our practices of making and sharing knowledge order the world—not only how we understand the world, but how our practices make our material conditions for being in the world—is difficult, and it strains the boundaries of how technical communication has been traditionally defined outside of our discipline. An ontological frame for technical communication is much less stable and less generalizable than imagining technical communication as a set of flexible skills that will allow professionals to communicate across areas of expertise and facilitate participation with non-experts outside of their discourse communities.

I am taking an iterative coding approach to data analysis and interviews, which means that while I have established a starting place in terms of language and theoretical frames that make sense to me, I am resisting the urge to determine codes and themes ahead of time. My central questions lie at the intersections of technical communication, political engagement and public rhetoric. These are questions that also function at to be at the center of new materialist theory. In the conclusion to his recent book on media theory John Durham Peters (2015) laid out this overwhelming challenges for fellow scholars: “We need a better name for the infrastructural aesthetics and ethics of being alive with others in the cosmos” (p. 380). While

such an overarching project can't be the scope of my dissertation, it is this call for better language, which in terms of technical communication and new materialist theory is always about both the doing and the saying of language, that grounds my work. While I expect to add to and refine the theoretical questions that will inform my analysis, these are some of the starting points I see situated in new materialist theory:

- What is the relationship between embedded infrastructure and institutional critique?
- What does ethical practice, and participatory technical communication look like?
- What language can we give to the movements between cooperation without consensus, operational decision making, public policy, and community response?
- How can tracking those movements, with attention to method and collaboration across discursive fields make visible ways for sustainable, ethical response to complex problems?

The empirical research I describe below will both guide my engagement with new materialist theory and help me explore its implications for a technical communication praxis grounded in collaboration and ethical, sustained response to wicked problems.

Research Design

This research combines three common methods in technical communication research, with an eye toward identifying the differences that matter, with the goal of articulating a participatory research framework for further interdisciplinary work.

Case Study

The first part of this project will be a case study that examines media accounts and official public documents related to the Scott County outbreak and the subsequent state-wide needle exchange law that emerged in response. Because of the rising concern about the opioid epidemic in the US, and the myriad of complex problems tangled in response to that epidemic, including disease

prevention, needle exchange in Indiana has received both local and national media coverage over the last two years. There is also a large pool of official documents from State and County health departments that chronicle the operational decision making related to implementing and supporting needle exchange. For example, there are more than 30 press releases issued from the Scott County health department between February 2015 and May 2016. There are also more than 78 documents created by the Indiana State Health Department (ISDH) to offer counties guidance on implementing needle exchange or syringe exchange programs (These terms are often used interchangeably). I have also begun tracing the path of needle exchange policy and discussion that is playing out in county council meetings and in local news reports as counties work to implement needle exchange. So far I have found transcripts and news articles surrounding the Tippecanoe County needle exchange, and the decision to defund the needle exchange in Madison County. Document analysis to trace what happened in the wake of a public response to crisis is a traditional and flexible method for understanding the role of technical communication in sense-making (Vealy, 2016; Weick, Sutcliffe and Obstfeld, 2005; Dragga and Voss, 2003). Storytelling gives language to the actions that were taken (Weick 1988) in response to the initial outbreak, which will allow me to establish the geographical and ontological epicenters of this study, and help to identify possible research partners in the community and in other fields of research, for example, public health and public policy development. Preliminary research, for example, shows that Monroe County has been highly successful in establishing a syringe exchange program. Madison County, which established a needle exchange in 2015 recently suspended all county funding for the program. Tippecanoe County received authorization for a needle exchange in 2016, but has struggled to win public support and establish a location for the exchange to operate. Tracing the trajectories of these different iterations of the needle exchange law will help to identify the evidence of tacking back and forth that will help me to develop a coding structure for mapping while also helping me to narrow the field of possible interview subjects.

Mapping

Using the same data set collected for narrative sense making, this study will also employ situated analysis (Clarke 2005) through mapping. This is a grounded theory approach to coding data that also takes into account the spatial and relational aspects of a phenomenon, which are necessary for developing participatory methodology/ Mapping is a way to make visible the language, discursive practices, and tacit negotiations that make up the tacking back and forth tendency that Star describes. In my early research and reading of the public documents and news accounts I am begging to track patterns of speakers for example the stakeholders interviewed in a news article and the speakers recorded in minutes from a city council meeting. I am also attentive to the gaps and silences present in these public documents. Addicts are often used as a framing device in news articles. While their names, behaviors, and sometimes pictures are present in the articles they are never the focus of the story, they are part of an assemblage that includes the needles, the drugs, and the policies that affect them. I am interested in tracing, both in the media accounts and the available public policy documents who and what is allowed to speak. While some individual voices of practitioners, lawmakers, and advocates are visible it is often the case that what speaks is the assemblage: the policy itself as enacted in multiple ways through mundane documents, community interpretations, and cooperative decisions made. The Coding and mapping data will layer with the narrative case, and help to make clear how emergent infrastructure develops through technical communication and the everyday work of operational response. For much of current technical communication research our work would stop here, with recommendations for pedagogy and practice. These are valuable, but not often taken up by our curriculums or practitioners outside the field of technical communication. At the same time, disciplinary and institutional boundaries don't often allow for sustained collective action. This study joins others (Mulvaney and Druschke 2017; Walton, 2016; Moore and Elliot 2015; Simmons and Grabill, 2007) in arguing that frameworks for more sustained collaborative engagement with complex problems is needed.

Participatory Design

The interview portion of this study will engage the point of view of public health workers and researchers who are addressing the problem of needle exchange, or IV-drug related disease prevention more broadly from outside the field of technical communication. For example Interviews will be guided not by ethnographic questions about work practices or field specific discourse, but first by a semi-structured discussion about points of resonance and dissonance when we consider the data and discussion generated by data analysis and mapping from my technical communication research approach to understanding problems. This study will take a collaborative approach to identifying the diffraction patterns-- the differences in material-discursive practices for making knowledge that make a difference-- in order to develop possible frameworks for sustained interdisciplinary and interinstitutional collaboration for addressing complex problems. I plan to conduct between three and six interviews with county health workers and scholars doing similar work in other disciplines.

Ethical concerns: reciprocity and partner research

Part of the tension with participatory methods continues to be about reciprocity. This action-oriented approach to research poses multiple problems. As university-based scholars in technical communication, not field-based practitioners, we aren't always the experts needed, and we can't assume that we can fill the role of experts with content specific expertise (Salvo, 2006). We also cannot operate as experts or mediators who intervene to "do communication" for a communities. While we might see ourselves as active members of communities, and might be seen as such by community members, we are also always members of the institutions in which we work, and our participation, framed as research, can rightfully be seen as opportunistic or predatory, rather than participatory. Blythe, Grabill, and Riley (2008) describe how their position as researchers identified them as outsiders to the communities they wished to serve:

For many citizens (insiders) with whom we spoke, the lines between insider and outsider overlapped with government and the community. The term government in this case meant not only any actual government institutions, but also outsiders, like us, who were associated with governmental bodies. (p. 283)

Our own assessments of our research practices, as well as much of the scholarship in service learning and community engagement, show that the community isn't wrong to see researchers, even conscientious and community-engaged researchers, as also embedded in and associated with government bodies and institutions. Our work might be with communities, but our research tends to be for and about them. Clay Spinuzzi (2005) describes this dual role as research that "involves alternating between practical work to support changes (such as design activities) on one hand and systematic data collection and analysis on the other hand" (p. 164). While data collection and analysis can be part of the practical work we do in communities, it is also often the work we are doing in order to justify and quantify our participation to our institutions through publishing results. This ongoing tension between what counts as evidence in disciplinary terms, and what is useful for building cooperation and ongoing response to public problems, is at the heart of what I hope to articulate with this project.

So, when I talk about *diffractive methodology* as performative research in technical communication, what I'm getting at is being more deeply engaged with complex problem solving by partnering with experts distributed across networks to do work that responds to immediate needs while also paying attention to the need for sustained response. Barad might describe this as a method that engages "intra-action" rather than "interaction" (p. 140-141). As she describes these partnerships of knowing, they entail "differential responsiveness and accountability as part of a network of performances. Knowing is not a bounded or closed practice, but an ongoing performance of the world." (p. 149). I see potential models for this research by looking to other scholars operating at the intersection of rhetoric, technical communication and interdisciplinary work. For example, Kate K. Mulvaney and Caroline Gottschalk Druschke (2017) recently

published a study drawing on interviews with members of the fishing and research communities working to address issues of climate change in New England. Participants' responses highlighted the complications of reciprocity and the need for more trust, more collaboration and more listening between different kinds of researchers and practitioners engaged in understanding a changing ocean. Among the complications were central questions about what counts as evidence when considering policy changes and practical applications among fishers. Mulvaney and Druschke describe data collected by fishers in the community and its value (or lack of value if it is perceived as not scientifically rigorous) to the climate scientists and policy-makers determining regulations and interventions to protect fisheries (p. 180). They also noted that communication and trust between members of the community, researchers, and policy makers are barriers to effective and sustained collaborative research.

While our research topics and the complex problems we address differ, Mulvaney and Gottschalk's methods and conclusions make visible concerns and questions I hope to address with my research. What common concerns do we share across disciplines, fields of influence, and communities of practice? How do we create networks for collaboration and response to complex problems? How do we confront with the difficult questions of what counts as evidence, and whose voices are included in decision making about infrastructure that supports communities? While my research plan doesn't include direct interviews or participation that would include the marginalized voices of drug users who are directly impacted by harm reduction strategies like needle exchange, and who feel the material effects of the policies that are being enacted through county health departments, I will focus on making those absences visible, both in my data analysis and in my interviews with practitioners. Addressing the problem of "what counts as evidence" isn't only a problem of research methodology, but a question of rhetorical practice that can only be effectively and ethically answered in collaboration. My research will, hopefully, lay the groundwork for future collaboration and more long term active research projects that can engage all stakeholders including those that are

marginalized and most vulnerable. I am concerned first with making sure my research is not exploitative of populations who will not benefit from what is, at this point an exploratory project.

Because of the geographical nature of this study and the specificity of its subject matter, truly anonymizing my work would be difficult, if not impossible. Instead, Rather than attempting to fully de-identify data, I plan to follow ethical practices well-established in community engagement research (Moore and Elliot 2015; Flowers, 2008; Cushman 1996, 1999, 2002) that seeks to engage research participants as partners who have voices in and potential to benefit from further research and sustained collaboration that creates effective results. I will explain this approach to potential participants during recruitment and engage in joint decision-making to determine the best approaches for balancing the risks and benefits of research. I will employ member checks that engage my interview participants meaningfully and incorporating their feedback regarding the inclusion, discussion and conclusions of study results. Because my research is exploratory, I hope it will lead to richer data analysis and a more collaborative approach to outcomes and discussion (Alsup 2010). Alsup recommends incorporating an approach that stays conscious of the value of anomalies and unexpected patterns in data and responses (p. 101-102). My interviews and member checks with interview participants will incorporate questions about those anomalies. I understand member checks as an opportunity for listening, for collaboration, and for a better understanding of what collaborative, interdisciplinary research questions and research design that takes reciprocity seriously might look like. Because I am interested in how this project could inform, and possibly build relationships for future collaborations, and because I am interested in articulating as part of my methodology frameworks for sustained response to complex problems, working with interview participants, getting their feedback, and incorporating their responses in my analysis is integral to my success.

Data Collection and Research Schedule

Documents

I met with Bert Chapman, a research librarian, to review possible data sets and locate public documents relating to needle exchanges in Indiana. Our preliminary research located over one hundred easily accessible public documents relating to the initial outbreak in Scott County and the subsequent implementation of statewide guidelines for needle exchange. With support from Chapman, I will complete further research for county-level documents at county health departments and county council sites to locate as much information as I can about the implementation of needle exchange. Because I'm interested in the movement between policies and the cooperative practices required to implement them, as well as how policies and communities interact as the policies move through different counties and administering agencies. I will also investigate public conversations about needle exchanges in Indiana. Using the Gannett database, I will search Indiana newspapers for stories about needle exchange using the date range of January 2015 and October 2017. A cursory search using the terms "Needle Exchange" and "Indiana" yielded 781 full-text articles. I will need to make decisions about which articles to include in my sample and what kind of coding I might employ in order to put the news articles in conversation with policy documents, both for the purposes of storytelling and for situated mapping.

Interviews

Interviews will be conducted toward the end of this study, after I have had time for document collection, processing, and analysis. While the interviews will take place later in the timeline, I will make contact with potential subjects early, as soon as my IRB is complete. I am in the process of compiling a contact list for county health departments that have established, or are considering the establishment of syringe exchange programs. My initial research shows

suggests Scott County, Monroe County, Madison County and Tippecanoe County would all be ideal partners because of the different levels of success each county has had implementing syringe exchange programs. I am interested in mapping the ways that the practitioners in these different counties have operationalized needle exchange, and their perspectives on the language, terms, and maps I use to make sense of needle exchange as a response to problems. I am looking for common language, or agreements, dissonances, and understandings that might make visible possible ways forward for collaboration and sustained research. I will also include at least one scholar-to-scholar interview, targeting scholars in public health, public policy, or management who are pursuing similar research—even if their research does not address Scott County or needle exchanges specifically. Much like the practitioner interviews, I am looking for evidence of how scholars in other disciplines read my language, conclusions, maps, and assumptions about the outbreak response. I see the interviews as a method for identifying the diffraction patterns, the differences that make a difference which might allow for collaborative or at least more cooperative response across disciplinary boundaries.

Ideally, I will complete three and six interviews and transcribe the results. Data analysis of interviews will focus on resonances and differences that might inform sustained response through collaborative research. Annemarie Mol (1999) uses the term *ontological politics* to account for how we might think through research that locates where “new ways of doing reality are crafted” (p. 75). Ontological politics requires that our research practices allow for multiplicity rather than plurality. Mol uses the example of anaemia and describes the way that “when one observes what is done in practice, anaemia appears to be performed in several different ways” (p. 77). She describes both clinical and laboratory performances of anaemia and how the reality of anaemia is not perspective dependent. There are multiple performances of anaemia that exist, at the same time and for different purposes. A person occupying one perspective, for example either the perspective of a researcher or a patient, can experience multiple performances of anaemia at the same time. Each of these performances has its own

history and its own consequences and its own ways of normalizing, silencing and pathologizing lived experience. The set of questions Mol raises are a useful frame I think for articulating a collaborative response and interdisciplinary research frameworks. “Where are the options? What is at stake? Are there really options? How should we choose?” (p. 79). I see these questions as the starting point for mapping how practitioners and scholars across disciplines operationalize their knowledge in response to a complex problem. Looking for those multiplicities and considering how collaboration across those multiple points of view will inform and give shape to more ethical and sustainable response is at the heart of this work. In this manner, analysis of interviews will take my analysis of documents into account and not only approach my research questions regarding complex problem solving but the reciprocity necessary for ethically engaging the people involved.

Schedule

November 2017

- Draft IRB protocol.
- Make decisions about data sets for document analysis
 - Consult with mentors on #womeninTC slack
 - Choose and justify samples for analysis

December 2017

- Defend prospectus.
- Finalize and submit IRB protocol for approval.
- Develop contact list for county health departments who have or are in the process of establishing needle exchanges, this list might include community organizations working in cooperation with county health departments.

- Develop bibliography of academic work engaging needle exchange, community engagement, disease prevention, public policy relating to needle exchange from other disciplinary perspectives. Identify possible interview subjects and develop a contact list.
- Collect and organize documents for analysis. (News articles, Press releases, reports, state law. County council meetings?)

January 2018

- Finish infrastructure approaches and practices article for Crow.
- Work on document analysis, case study and mapping,
- Contact possible interview subjects when IRB is approved.
- Work on tear off article and/or writing sample.

February 2018

- Work on document analysis, case study and mapping.
- Use results of document analysis to further collaborate with potential interview participants. Identify and contact scholars for interviews based on what emerges from document analysis.

March-April 2018

- Build relationships and work on collaboration for interviews
- Consider contingency plans and make connections with possible scholars for interview subjects.
- Balance interviews with drafting
 - Revise and finalize writing sample
 - Draft chapter outlines
- Begin transcription.

May-June 2018

- Wrap up interviews.
- Begin transcription.

- Work on narrative explaining relationships between document analysis and interviews.
- Follow through on member checks and discussions with participants as I analyze interview data.

June-August 2018

- Write complete (shitty) first drafts of all chapters.
- Prepare for job market.

September 2018-March 2019

- Apply for jobs and do work necessary to support applications.
- Work through member checks/follow up conversations with participants
- Complete revisions.

April and May 2019

- Defend Dissertation

Chapter Outline

1. **Introduction** — Frame emergent infrastructure and collaborative work in response to crisis as the exigence for this work. Crisis makes visible the distributed work of responding to the immediate needs of communities in the midst of outbreak, breakdown, or recovery. Complex problems where entangled human-nonhuman assemblages respond to crisis demonstrate the need for new materialist methods in technical communication. This introduction will use storytelling to establish the Scott County outbreak as a site where emergent infrastructure is visible. As I near the end of this project, I will draft the second half of the introduction that lays out the argument, signposts all the chapters, etc.
2. **Literature review** — This chapter will describe the ongoing conversation in technical communication about new materialist methods, and more broadly a discussion about what counts as evidence when our problems are increasingly entangled across social,

economic, technological and disciplinary boundaries. New materialisms can inform and expand on methods taken up in the critical turn in technical communication, to engage the complex history of technical communication as complicit in perpetuating power imbalance and discriminatory infrastructure. New materialist methods have at their core an ethics of accountability for the apparatus we develop and the possibilities for response that technical communication makes visible. This review leads to an argument that more sustainable, response-able (Diane Davis) methods for research and intervention are required if technical communication researchers want to participate in complex problem solving. A performative, new materialist methods approach to technical communication requires collaboration and cooperation across disciplines and communities of practice.

3. **Methodology + Methods** — This chapter is a description of my methods for data collection, iterative coding, and mapping of the data sets I develop from public documents. I describe my research design including interview protocols and approaches to reciprocity and participatory research. It will show how I adapt the definitions and theory of new materialism can inform mapping and help me to articulate interview questions and identify the geographic, professional and disciplinary foci that will allow me to identify interview participants.
4. **Results of Scott County Data analysis** — This chapter will explain the results of my data collection, using that data to illustrate the emergence of needle exchange as (a) a case study and (b) mapping related to the terms and codes I identify in the data sets which demonstrate the emergence of needle exchange as a complex response to immediate needs. Needle exchanges emerge as a boundary object that allowed for distributed groups to cooperate without consensus. The codification of emergency response into state law allows for an opportunity to trace the tacking back and forth of a boundary object—needle exchange—as it moves back and forth between policy and

distributed practice. New counties that establish or attempt to establish needle exchange programs in response to elevated risk of infection and illness due to IV drug use must adapt policies and create new agreements and negotiations for cooperating to respond to the exigence of disease prevention. Embedded in this analysis is continuing attention to the silences and gaps this analysis makes visible, including who is silenced or made invisible by the negotiations and cooperative strategies working groups agree upon.

5. **Results from three to six interviews** — This chapter will analyze the data from three to six interviews with county health workers and scholars who are approaching needle exchange, disease prevention, or opioid addiction from other disciplinary points of view. Interviews will be based on data on my data analysis of documents, and focus on how others make sense of what is visible to me from a technical communication perspective. The methodological focus here is on diffraction, how noting differences in language, practice, operational decision making and methodological choices can make visible the resonances and gaps between ways of seeing and doing. Making visible these differences that matter will allow for a further conversations about what sustained, effective, collaborative response might require.
6. **Conclusion/Discussion and Implications** — This chapter will describe implications and possibilities for future research with the aim of articulating needed frameworks and possible methods for further long term research. I will explain how the methodological implications of this research might be generalizable to other research interests in technical communication.

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