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Policy-driven Digital Infrastructure Development in the U.S. Healthcare Industry: Shifting from Local to National Resistance in New Information Technology Implementation

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Policy-driven Digital Infrastructure Development in the U.S. Healthcare Industry: Shifting from Local to National Resistance in New Information Technology Implementation

by

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Policy-driven Digital Infrastructure Development in the U.S. Healthcare Industry: Shifting from Local to National Resistance in New Information Technology Implementation

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Abstract: The increasing capabilities of information technologies (IT) stand to change various types of work. Realizing the transformative potential of IT applications such as artificial intelligence and Big Data analytics relies upon the construction of digital infrastructures capable of capturing, storing, and communicating large amounts of data. In many industries, digital infrastructure development occurs organically as organizations decide to adopt IT that enable access to the infrastructure, with the goal of innovating work processes, collaborating with other organizations, or providing new strategies for evaluating and managing work. Recently, though, government agencies have begun expediting the digital infrastructure creation and growth processes in hopes that infrastructures will enable data-driven innovation, collaboration, and evaluation in public sectors, including education and healthcare.

The literature on IT implementations in organizations tells us that the deployment of new IT rarely goes smoothly, particularly when IT use requires substantial changes to everyday practices, existing roles, or established power hierarchies. When workers perceive the effort or threat of IT use to outweigh the benefits of use, they resist the IT in various ways (e.g., by misusing the IT or voicing concerns to managers). Given that digital infrastructure development requires commitment from workers in contributing
high-quality data, resistance to new IT should be of particular concern to scholars of
digital infrastructures and practitioners who participate in infrastructure development.

However, few studies of digital infrastructure development identify and explain
why and how resistance to digital infrastructure IT emerges, perhaps because most
research on digital infrastructure development has occurred in industries such as
scientific and academic research, where the implementation process is assumed to be
gradual, participation is assumed to be voluntary, and control over IT use is left for
organizations to decide. In such cases, organizations can deal with resistance to the IT in
traditional ways—by incorporating workers into the IT design and selection process, by
customizing or replacing the IT, or by easing requirements for use—and gradually
develop practices that are sensitive to local needs and suitable for contributing to the
digital infrastructure.

The shift toward rapid, mandatory, and centralized IT implementation under
federal policies renders these options unavailable to organizations and workers.
Particularly, the forms of resistance and responses to resistance traditionally documented
by scholars of IT implementations—such as workers misusing the IT and managers
reactively customizing IT—might be insufficient in explaining how and why workers and
organizations reach IT implementation outcomes because strict government policies
govern what workers and organizations can and cannot do to alleviate the burdens
introduced by the new IT. How, then, might workers resist policy-driven IT
implementations in the absence of traditional avenues for resistance, and how might
organizations deal with resistance when government policies direct IT decisions?

This dissertation examines this question and related questions through a
qualitative study of mandatory electronic medical records (EMR) implementation in the
U.S. healthcare industry. The federal government recently invested over $30 billion to
subsidize EMR adoption costs, develop certification programs to promote EMR
interoperability, and implement strict guidelines for how caregivers must use the new IT.
I traced worker responses to the implementation by first conducting a case study of one
healthcare organization’s implementation of federally-certified EMR. Based on analysis
of semi-structured interviews, ethnographic observations, and documents collected during the study, I found that workers became frustrated with the time EMR use added to their days, the practices they had to develop to comply with policies for EMR use, and the administrative compliance-gaining strategies that managers developed using EMR.

Unlike workers studied in previous accounts of new IT implementation, caregivers had no outlet for shaping outcomes at the point of IT use. Likewise, organizations could not customize or replace the IT; instead, they used data automatically recorded in the EMR to develop EMR compliance strategies. Workers, faced with no local opportunities for resistance, turned to powerful professional organizations to resist the EMR program on their behalf. In the second part of the study, I documented this resistance movement and demonstrated how the presence of political opportunity structures enabled doctors and other caregivers to stall the progress of the digital infrastructure development program. Based on my analysis, I build a model of resistance to mandated digital infrastructure IT implementations that accounts for workers’ inability to resist these IT at the point of IT use, for organizations’ and managers’ inability to make locally-sensitive IT decisions, and for the influence of actors outside of the boundaries of the organization. The model illustrates how managers in policy-driven IT implementations do not have traditional means available for gaining worker acceptance of the IT; instead, they develop strategies to gain worker compliance with both federal and local policies. Workers, stuck with a particular IT and new policies, route their resistance to the national level. I conclude the study by considering how this model might be applied and adapted to other policy-driven digital infrastructure programs.
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Chapter 1: Introduction: *Building Digital Infrastructures to Transform Work*

Various types of work are changing alongside the introduction of new information technologies (IT) in organizations. Automation, robots, Big Data, artificial intelligence, and other burgeoning technologies are, according to many scholars, technologists, and commentators, positioned to fundamentally change workers’ day-to-day practices or replace human workers altogether (Bostrom, 2016; Brynjolfsson and McAfree, 2014; Ford, 2015; Kaplan, 2015; Manyika et al., 2011). Such predictions about new technologies fundamentally changing the ways we work are hardly new. Technologies such as numerical control and early forms of automation drove scholars to study and predict what technological development means for organizations, managers, and workers (Cooley, 1980; Noble, 1984; Parsons, 1983). Studies of the deployment of new IT demonstrated that organizations historically chose to implement new technologies in earnest to transform the management of work—e.g., by using timecards and instruction sheets to institute scientific management principles and add structure to work (Taylor, 1914)—or to provide workers with new equipment for carrying out work—e.g., by introducing the assembly line to increase the speed, efficiency, and quality of manufacturing processes (Hu, 1961; Walker and Guest, 1952).

Today, the same is true. Organizations in various industries are now focused on capitalizing on the transformational potential of interconnected networks of digital technologies, often referred to in the information science and information systems
literatures as digital infrastructures (Barrett et al., 2015; Tilson et al., 2010). These organizations invest significant amounts of money and other resources to adopt and implement IT that provide workers with access to digital infrastructures, such as scientific research enterprises joining data sharing and collaboration programs (Borgman, 2010; Ribes and Lee, 2010; Star and Bowker, 2006) and humanities institutions building infrastructures for methodological innovation (Borgman, 2009; Thaller, 2012; van Zundert, 2012). Access to these infrastructures and the data they hold is essential for realizing the promises of computational approaches to solving problems, including Big Data analytics and AI.

At first glance, digital infrastructure development appears to present the same central challenge posed by other technological predecessors: getting workers to use the new technology in ways that align with stated goals of implementation. The technology and work literature tells us that when organizations introduce new IT, various types of work and work processes become digitized and “informated,” often with an array of consequences that shape workers’ and managers’ perceptions and uses of the IT. Zuboff (1988: 10) described informat work as work that translates descriptions and measurements of activities, events, and objects into information. She noted that informat work has profound organizational consequences because the process can be simultaneously empowering and oppressive to workers, a duality that has been explored further in the decades since In the Age of the Smart Machine was published (e.g., Monteiro and Hanseth, 1996; Orlikowski, 1992; Volkoff and Strong, 2013). On the one
hand, documentation of work processes via IT serves to channel important information to non-managerial members of the organization. Accordingly, scholars have observed that many IT implementation efforts explicitly aim to improve the speed and efficiency of organizational processes or manage the quality of organizational outputs by making information visible and accessible to a wide variety of workers (Berente and Yoo, 2012; Gosain, 2004; Thornton and Ocasio, 2008). Workers armed with access to information can take on new tasks and decision-making responsibilities (Collins, 2001; Davis and Taylor, 1986; Lucas, 1975a; Zuboff, 1988).

On the other hand, managers can exploit IT-enabled information visibility to evaluate workers and promote the widespread integration and control of processes within and between organizations (McLeod, 1990; Zuboff, 1988). Workers might recognize that certain organizational activities they perform are rational or mechanistic and can be routinized or automated using computers, contributing to perceptions of oppressiveness or fear of being replaced (Ciborra, 2000; Davenport, 1998). Similar stress and fear may loom over workers charged with making digital infrastructures a part of their everyday work, a proposition that is central to this study. Still, organizations and their managers often view new technologies as innovative and implement them with enthusiasm, driven by their desire to be on the “cutting edge” of their industries (Bailey, Leonardi, and Barley, 2012; Barley, 1986; Edmondson, 1999; Edmondson et al., 2001).

Organizations implement new IT with enthusiasm because they expect to receive a return on their investments (Bharadwaj, 2000; Dos Santos, 2003; Hitt and Brynjolfsson,
Exploiting IT’s full potential depends largely on workers engaging with the technology thoroughly and frequently. Scholars of technology and work inform organizational efforts to elicit this engagement by providing a repertoire of theories that describe the processes by which workers adopt and adapt new technologies and explain how these processes relate to organizational outcomes (Poole and DeSanctis, 1990; Leonardi, 2011; Orlikowski, 1992; Orlikowski and Barley, 2001). A common finding of such studies is that workers often resist new technologies, sometimes because of aforementioned perceptions of oppressiveness (e.g., Markus, 1983) and sometimes because the technologies represent unwelcomed changes to individual or group processes (e.g., Joshi et al., 1991). Decades of research on IT implementations in organizations provide insight into the sources of resistance and its potential organizational consequences.

Lapointe and Rivard (2005) developed the current dominant model of resistance to new IT implementations in organizations. They defined resistance via a set of dimensions: subject, object, initial conditions, interaction, perceived threat, and resistance behaviors. Individuals and groups, or subjects, resist an object, such as new routines or characteristics of the new technology, when it stands to change a set of initial conditions—existing routines or technologies, for example. Interaction refers to a process in which matches and mismatches between the demands of the new technology and initial conditions emerge. When mismatches are salient, workers sometimes perceive the IT as a threat to their power, efficacy as an organizational member, or level of effort required for
day-to-day activities. In response, workers engage in resistance behaviors, including condemning the new technology through speech, refusing to engage in new procedures, or misusing the technology.

Scholars who study resistance to IT recognize that mismatches emerge in daily interactions among workers and IT and therefore have documented implementation at the individual and group levels (e.g., Joshi, 1991; Lapointe and Rivard, 2005; Marakas and Hornik, 1996; Markus, 1983). They take a social constructionist approach that emphasizes how resistance begins at the micro level of work practices and engenders changes that “reverberate up levels of analysis” (Barley, 1986: 61) to influence broader organizational outcomes. Accordingly, studies of resistance document how workers resist technology at the point of technology use, documenting these responses through observation, interviewing, or conducting and analyzing surveys (Bauer, 1997; Bhattacherjee and Hikmet, 2007; Joshi, 1991; Lapointe and Rivard, 2005; Marakas and Hornik, 1996; Markus, 1983). At best, the outcomes of resistance highlight the flaws and shortcomings of the new technology and serve as guides in redesigning the technology itself or the practices around it (Chou and Chang, 2008; Garud and Nayyar, 1994); at worst, resistance leads to outright rejection of the technology and, in some cases, failure of the implementation (Barker and Frolic, 2003; Chen, Law, and Yang, 2009; Lucas, 1975b). Armed with an understanding of how to identify and manage resistance, organizations might ultimately deal with resistance by adopting a different technology,
reverting to the previous technology, or redesigning or customizing the technology when initial signs of trouble surface (Agarwal and Prasad, 1997; Chou and Chang, 2008).

Resistance is an important phenomenon to pay attention to in studying digital infrastructure development for at least two reasons. First, digital infrastructure creation and growth often depend upon implementing the same or very similar IT simultaneously across a variety of organizations. Second, digital infrastructure requires standardized use across a wide set of workers. Both of these factors enhance the risk of locking in problematic IT or organizations abandoning the infrastructure altogether; consequently, identifying resistance when it emerges should help to ensure the long-term health of the infrastructure.

However, the forms of resistance workers traditionally elicit in response to IT implementations may not be enough to shape the outcomes of digital infrastructure developments. The pursuit of standardization requires a large segment of the organizations in a given industry to adopt and implement similar technologies simultaneously and ensure that workers are using the IT in uniform ways, so as to ensure the quality and reliability of the data collected. In the public sector, the federal government is in charge of encouraging adoption of interoperable IT and regulating IT use to ensure standardization. In industries within the public sector, including education and healthcare, organizations are implementing digital infrastructure IT not because they view these technologies as innovative or even advantageous, but because government policies incentivize or mandate adoption. How, then, does the implementation of policy-
Driven digital infrastructure IT differ from traditional IT implementations in organizations? The central argument of this study is that policy-driven digital infrastructure development renders organizations’ choices about which technology to adopt, how to implement it, and how to respond to any resistance limited, or even nonexistent.

**Policy-Driven Digital Infrastructure Development in U.S. Education and Healthcare**

Federal and state governments increasingly strive to remedy socially-important problems via technological transformations of entire industries. To do so, policymakers institute mandatory regulations for technology adoption and use to promote standardization, interoperability, and growth of the infrastructures. In these cases, organizations and workers have little recourse when technologies begin to falter. Such IS-led regulatory mandates are underway in industries including education and healthcare (Bienkowski et al., 2012; Blumenthal, 2010; U.S. DOE, 2014).

In education, for example, state and federal government agencies increasingly require administrative use of learning analytics to improve educational outcomes (Baker and Inventado, 2014; Bienkowski et al., 2012; Ferguson, 2012; Greller and Drachsler, 2012; Elias, 2011; Siemens and Long, 2011). The analytics movement in education is an offshoot of the broader trend toward leveraging Big Data analytics to inform organizational decisions (Macfadyen and Dawson, 2012). Under this paradigm, elementary school, high school, and university administrations capture and store data
generated from the activities of teachers and students, including standardized test scores and student outcome data. Education agencies then analyze these data to make decisions about how to allocate resources, develop competitive advantages, and improve the quality and value of the learning experience (Siemens and Long, 2011). For example, a district might analyze data from its schools, find correlations between class size and test scores, and implement new strategies (Bienkowski et al., 2012). The goal of state and federal policies requiring digital data collection is to aggregate educational data and use analyses to inform lawmaking, funding decisions, and other governmental processes.

The U.S. Department of Education’s National Education Technology Plan is one such example. The plan urges K-12 schools to begin tracking student and teacher performance by developing state and national databases that record educational data (Bienkowski et al., 2012). The National Conference of State Legislatures Several states, including California, Maryland, and Oregon, now mandate such systems for their public schools (Deschaine, 2013; Lauermann and Karabenick, 2013; Morrison et al., 2014). In these cases, organizations (schools) have little say in technology adoption decisions because in-house databases must be interoperable with state databases and comply with regulatory standards (Deschaine, 2013; LACE, 2015). Likewise, workers (teachers) have little opportunity to resist use of the technology, as schools must comply with new standards for measuring and evaluating educator and student performance (Boffy, 2015; Coleman, 2015). This scenario is likely to become increasingly common as the trend toward policy-driven use of analytics in education accelerates under the 2015 Every
Student Succeeds Act’s Title IV A: Activities to Support the Effective Use of Technology, which requires federal and state policymakers to set forth plans for building a digital infrastructure for education.¹

Because they have little access to the technology that tracks their performance, teachers have taken to other tactics for resisting state and federal IT programs. Teachers unions and their leaders are speaking out about their opposition to some of the core components of the plan and levying criticism against the use of test score-based indicators to measure, analyze, and compare educator effectiveness (Sawchuck, 2015). Furthermore, state teachers’ unions are expressing concern that national education technology standards amplify the effects of other data-driven reform efforts such as Common Core. The New Jersey Education Association, for example, is currently drafting educational reform legislation that takes aim at data-driven evaluation policies in schools, and over a dozen other unions have introduced similar “educational freedom” legislation in their states (Albright, 2015).

Part of the reason that educators see the need to politically resist digital infrastructure policies is that broader professional and organizational outcomes might result from the successful construction of a digital infrastructure. Unlike past technologies such as assembly lines or office computers, digital infrastructure IT is poised to change more than workers’ day-to-day practices; in the case of education, these

¹ Title IV A of the Every Student Succeeds Act addressed several other IT-related issues beyond digital infrastructure development, including expansion of access to computer science education, inclusion of digital devices and media in instruction, and professional development for educators to learn strategies for integrating IT in the classroom. The full legislation is available at: https://www.ed.gov/essa?src=rn.
technologies also stand to wrest control of decisions away from educators, schools, and local governments. For example, the stated goal of federal digital infrastructure policies is to standardize what teachers teach students and how they teach it based on analyses of aggregated data (Bienkowski et al., 2012). Thus, political resistance to the digital infrastructure program is not just about preserving existing work practices, but also about maintaining professional, local, and state autonomy.

Teachers and schools are not the only public sector industry undergoing changes associated with federal efforts to build digital infrastructures. The healthcare industry provides another current example of mandated digital infrastructure development. The U.S. federal government recently invested $26 billion in a program that aims to revolutionize the work of millions of doctors, nurses, and other healthcare practitioners via the implementation of electronic medical records (EMR) (Blumenthal, 2010). The government mandate includes strict guidelines for the design of the technology as well as standards for use of the technology. In 2009, government healthcare agencies began distributing monetary incentives for organizations to adopt and implement EMR-based IT from government-certified vendors. The goal of this portion of the plan is to provide a foundation for the construction of a digital infrastructure in the form of a standardized national health information exchange through which healthcare providers could share and analyze large sets of patient data to reduce costs and improve healthcare outcomes (Blumenthal, 2010). For example, sharing data about patient history between clinics might aid in avoiding repeat tests, X-rays, and medical procedures. Identifying trends in
the positive and negative outcomes of treatments could support doctors’ decision-making when determining the direction of patient care.

The opportunities to leverage aggregated data to improve healthcare delivery are numerous and well established among the medical community (e.g., Haynes, Devereaux, and Guyatt, 2003; Lee, Maslove, and Dubin, 2015; Straus et al., 2005; Tierney et al., 1990), the medical informatics community (e.g., Aydin et al., 1998; Barrows and Clayton, 1996; Goodman, Cushman, and Miller, 2014; Shortliffe, 1994), and the healthcare administration community (Buntin et al., 2011; Kellerman and Jones, 2013; Parente and McCullough, 2009; Rublee, 1989). These communities also recognize major challenges to aggregating medical data, including well-documented and highly-studied issues of privacy (Agich, 1994; Annas, 2003; Braithwaite, 1996; Cooper and Collman, 2005; Ingelfinger and Drazen, 2004; Goldman, 1998; McGraw et al., 2009). Another major challenge is ensuring that the quality, quantity, and uniformity of the data collected, stored, and transmitted in the digital infrastructure are sufficient for accurate, reliable analyses (Blumenthal and Tavenner, 2010; CMS, 2013; HealthIT.gov, 2015). To overcome this challenge, the federal government’s EMR program went beyond adoption incentives by defining standards with which EMR users must comply. To this end, the U.S. government defined various stages of technology use that workers must engage in over a period of seven years, challenging doctors and other practitioners to gradually increase the range of technology features they use. If healthcare workers and organizations do not meet these standards for use, they are financially penalized: federal
insurance programs such as Medicare and Medicaid reduce the payments of non-compliant workers and organizations for services rendered to patients (CMS, 2013).

Healthcare organizations were eager to adopt the new digital infrastructure technology at a reduced financial cost (CMS, 2013). The federal program drastically increased the number of practices using electronic medical records from 18% of all providers surveyed in 2001 to nearly 80% in 2013 (CDC, 2014). But as decades of technology and work research would predict, the presence of the new IT has not been generating universally-positive outcomes. In fact, many healthcare workers adamantly resisted the technology when it was first introduced, placing the massive implementation at risk of failure (Ash et al., 2012; Blumenthal and Tavenner, 2010). For example, Gupta, Raja, and Khorsani (2013) found that doctors avoided automatically-generated alerts and reminders by entering false data into the EMR so as not to trigger the pop-up style warning about drug-drug interactions. Similarly, Frazee, Harmon, and Papaconstantinou (2016) documented the implementation of an EMR in two hospitals and found that in one setting, cardiologists spoke out against the implementation to managers and their peers, noting the low utility of EMR relative to other medical technologies. Accounts of resistance to EMR, though, are rare and stand in contrast to the types of resistance teachers are demonstrating to federal programs aimed at building digital infrastructures for education: Whereas teachers have little access to the technology that tracks in the background their performance and that of their students, doctors and other healthcare practitioners interact on a daily basis with the EMR technology that gathers and stores
patient data. For this reason, we would expect that many forms of healthcare workers’ resistance are of the localized variety that technology and work scholars routinely document and explain. These forms of resistance, which I discuss at greater length in Chapter 2, occur at the point of technology use and include intentional misuse (Smith, 1988; Tarafdar, Gupta, and Turel, 2013), individual refusal to use the IT at all (Beaudry and Pinsonneault, 2010; Boudreau and Robey, 2005; Workman, 2005), or group decisions to reject the IT (Rogers, 1983; Venkatesh, Speier, and Morris, 2002). Localized resistance often proves successful for workers and compels managers to customize (Chou and Chang, 2008) or replace (Barker and Frolick, 2003; Kim and Pan, 2009) the IT.

However, these local forms of resistance are unlikely to derail the implementation of EMR because of the government’s $26 billion investment and the federal policies guiding EMR deployment. Specifically, organizations are unable to customize the technology in response to resistance because of compliance standards, and workers are unable to refuse use of the technology because they need to satisfy system requirements to keep their jobs (AMA, 2015a). With few options to resist locally, doctors and other healthcare workers are currently engaging in other forms of resistance—namely, national resistance—that existing theories do not consider. Existing accounts of resistance demonstrate how workers resist via engagement with the technology itself. Doctors and other healthcare professionals, though, are actively resisting the technology not just by appropriating the technology in unintended ways in their day-to-day work; they are also organizing political action against the federally-mandated EMR program. The American
Medical Association (AMA), along with more than 40 other professional organizations, launched an effort in 2015 to convince federal regulators to cancel the EMR mandate altogether. This effort involves mobilizing groups of workers, directly lobbying government officials, and alerting the public to healthcare workers’ concerns about the program (AMA, 2015a, b).

**Resistance to Policy-Driven Digital Infrastructure Development**

Workers’ resistance to mandated digital infrastructure implementations, such as the resistance demonstrated by teachers and healthcare workers via teachers’ unions and the AMA, differs from the forms of resistance documented by technology and work scholars to date in two significant ways, both of which offer challenges and opportunities for theory development and methodology. First, whereas organizations typically have a choice about which technologies to adopt and how to apply them in practice, they have no such choice when regulations require implementation of a particular technology and a particular set of uses, such as in the case of policy-driven digital infrastructure implementation. Schools and healthcare organizations and their workers have no choice whether or not to adopt the technology and have diminished flexibility in how it can be designed and deployed. The mandatory and standardized nature of these implementations raises an important question unanswered by existing research: If workers cannot successfully resist changes by acting locally within (and against) their own organizations, how do they respond to mandated technology implementations? A comprehensive understanding of resistance can provide insight into how to recognize resistance as it
surfaces, even when it surfaces outside of day-to-day organizational activities, and how to assess its causes and outcomes, as well as potential avenues for overcoming it.

A second, related difference between the forms of resistance emerging in the education and healthcare sectors and existing accounts of resistance pertains to perspective. Existing research takes a localized approach, documenting workers’ resistance within the boundaries of a single organization and relating it to outcomes in that organization. Typically, localized resistance takes the form of direct engagement or disengagement with the technology itself, such as workarounds (Halbesleben, Wakefield, and Wakefield, 2008), sabotage (Shaiken, 1985; Wynne, 1988), or avoidance (Kane and Labianca, 2011). In many cases, this localized resistance is sufficient to derail implementation. In other words, if enough workers resist the technology in meaningful ways, managers and administrators have little choice but to act to remedy the technology’s shortcomings (Dickson, 1974; Markus, 1983). Healthcare workers can engage in direct resistance actions, but those actions will be unlikely to result in hospitals ceasing use of the EMR given the federal government’s mandate. Organizations’ ability to redesign or customize EMR is constrained by the EMR certification program and its strict guidelines for what EMR vendors can and cannot provide. Many hospitals and practices received incentive payments from the federal government to cover the monetary costs of adoption and implementation (CMS, 2015), but no aspect of the EMR program covers costs for switching vendors and retraining workers to use a new product.
Furthermore, localized resistance is unlikely to engender change because workers are financially penalized for nonstandard use of the technology. In cases of noncompliance, CMS withholds pay from either the worker or the organization. When a doctor owns his or her own practice, he or she absorbs EMR noncompliance penalties directly. Over 209,000 providers paid a 2% penalty on reimbursements for Medicare and Medicaid patient visits for failing to comply with Meaningful Use standards from 2014 to 2015 (CMS, 2015). Care organizations, such as a hospitals or clinics, bear the penalties for their workers, and the impact on individual workers can be direct or indirect depending on facility-specific policies. The penalty amount rises each year: 1% in 2015, 2% in 2016, and 3% in 2017. If 75% of all eligible practices attest to meeting Meaningful Use standards by 2017, CMS will cap the maximum penalty at 5%; if fewer than 75% are using EMR in the ways prescribed by the federal government, there is no maximum—CMS will continue to dock more and more Medicare and Medicaid reimbursement each year.

Given these penalties, minor acts of resistance can no longer escalate and derail implementations in the same way they might in situations lacking a powerful external force behind implementation. In such cases, neither the organization nor the worker can successfully resist the new IT via direct engagement with the technology. What, then, are alternative forms of resistance that workers might engage in when the technology itself cannot be successfully resisted? Studying these alternative forms of resistance will prove useful for explaining and predicting how large-scale technology programs unfold, where
to expect resistance to occur, and how to design policies and technologies that are sensitive to resistance that occurs beyond the point of technology use.

This second difference points to the potential role of collective action when workers are somewhat powerless to resist changes via day-to-day activities. To date, many theories of resistance cannot account for collective action because they take an individual, group, or multilevel view of resistance to account for factors that spark resistance and shape outcomes (Davis, 1989; Joshi, 1991; Lapointe and Rivard, 2005; Marakas and Hornik, 1996; Markus, 1983). As demonstrated by the actions of teachers’ unions and the AMA, sometimes forces that transcend the boundaries of the organization—such as professional organizations—play a more prominent role in resistance activities. Accounting for these forces may require new theoretical lenses that, to date, are underutilized in the technology and work literature. Two such lenses are institutional theory and social movement theory.

Institutional theory is a commonly-used lens that scholars of organizations and, less often, technology and work scholars use to deal with forces beyond the boundaries of the organization, particularly as these forces relate to IT adoption decisions. Likewise, social movement theory provides useful concepts for understanding this type of collective action and the mobilization that often accompanies it. Specifically, social movement theory aims to explain how attempts to control individuals’ actions through policies (Zald, 2000) and regulations (Carroll and Hackett, 2006) come into conflict with individuals’ motivations, perceptions, and values (Kurzman, 2003). These conflicts spark
periods of mobilization and negotiation, commonly through widespread resistance to the change (McCarthy and Zald, 1977; Tarrow, 1994). Three concepts from social movement theory offer explanations of the factors that facilitate collective action: relative deprivation (Gurr, 1970; Meyer, 2004), resource mobilization (McAdam et al., 1996; Morris, 1981; Snow et al., 1980), and political opportunity structures (Morris, 2000; Tarrow, 1994). Applying these concepts in evaluating cases of resistance to digital infrastructures might strengthen explanations of how resistance to a technology implementation emerges.

Moreover, bringing both institutional theory and social movement theory to bear on resistance to mandated technology use might aid in the development of theories that relate localized micro-actions to broader political actions to provide comprehensive explanations of resistance to technology. Accounting for the macro forms of resistance will be increasingly relevant as governments design, implement, and evaluate technology implementations aimed at transforming entire industries via new digital infrastructures.

In this dissertation, I strive to build a more comprehensive view of resistance to technology via a study of healthcare workers’ resistance to a policy-driven digital infrastructure technology. I begin my inquiry by examining theories that explain the localized forms of resistance that information systems scholars consistently document. I then consider institutional theory and social movement theory as two research streams with limited, but growing, application in research on new IT implementations and argue
that these theories might help explain why resistance to policy-driven digital infrastructure implementations emerges beyond the boundaries of the organization.

In the methods section, I describe the qualitative research approach I used to expand our understanding of resistance as actions that involve not only direct engagement with the technology, but also collective political and social action. In particular, I studied EMR implementation at one healthcare organization before exploring the national resistance movement against EMR. I first documented micro-actions in the workplace via interviews and observations with workers and managers to gauge the sentiments about EMR and the practices that supported EMR use. I then traced the formation and actions of organized movements against the policy-driven digital infrastructure implementation by analyzing formal communications, websites, and other documents and interviewing government officials, EMR vendors, and medical association representatives. I describe my mode of analysis of these data sources in the Data Analysis subsection before presenting the study’s findings.

In evaluating the findings, I build a model of resistance to policy-driven digital infrastructure IT implementation. The model highlights how and why workers engage in national resistance in the absence of traditional avenues for resisting new IT. I then relate the model to existing conceptualizations of resistance to new IT and prior research on digital infrastructure development. I offer avenues for expanding upon this view using concepts from social movement theory and conclude by addressing the limitations of the study and considering opportunities for future research.
Chapter 2: Literature Review: *Exploring Potential Resistance to Policy-Driven Digital Infrastructure Development*

Information science and information systems researchers have studied digital infrastructure development in a variety of contexts and have demonstrated interest in understanding and explaining the factors that influence active participation in it (Borgman, 2009; Edwards et al., 2007; Tilson et al., 2010). For example, researchers have sought to identify effective strategies for encouraging organizations to adopt and implement IT that support the growth of digital infrastructures and for persuading workers to exploit the full range of the IT’s capabilities, including the use of incentives and rewards (Henfridsson and Bygstad, 2013; Koh et al., 2007). Given this interest in garnering participation, we might expect that scholars of digital infrastructure development have explored resistance to digital infrastructure IT, yet few studies identify resistance as an obstacle to digital infrastructure development. In this chapter, I argue that resistance is not present in existing accounts of digital infrastructure development because these studies examined programs that grew gradually, offered voluntary participation, and remained decentralized in the process of standardization.

Below, I explore how these characterizations of digital infrastructures emerged before explaining why policy-driven digital infrastructure development programs upend these assumptions about infrastructure creation and growth. In particular, policy-driven digital infrastructure IT implementations are rapid, so organizations cannot make careful implementation decisions that are vital to preventing resistance; they are centralized, so
organizations and managers have little control over how to implement the IT and manage resistance; and they are mandatory, so managers and workers cannot develop locally-sensitive IT and strategies for accommodating use of the new IT. To establish why these characteristics of policy-driven implementations might engender resistance, I review research on the causes and outcomes of resistance to new IT implementation in organizations at each phase of the implementation process. I emphasize that existing accounts of resistance to new IT focus on activities that occur within the boundaries of the organization, particularly at the point of IT use. While useful for explaining the outcomes of implementations of new IT in single organizations or small sets of organizations, these localized accounts of resistance fall short when evaluating resistance to policy-driven digital infrastructures because IT choices are largely out of the hands of organizations, managers, and workers and are instead made by governmental policies. I pose a set of questions aimed at investigating how workers might resist policy-driven digital infrastructure development when traditional avenues for resistance are rendered unavailable by these policies.

**Characteristics of Digital Infrastructure Development**

Existing accounts of digital infrastructure development—particularly in the context of scientific research—have led researchers toward assuming that all digital infrastructure development is gradual, voluntary, and decentralized. These assumptions held true in the contexts in which they were developed, so they deserve exploration
before proceeding to test the assumptions in contexts in which government agencies aim
to exert top-down control over digital infrastructure IT implementation.

**Digital Infrastructure Development is Gradual**

One of the prominent assumptions of researchers studying digital infrastructure
has been that infrastructures develop modularly and incrementally (Star and Ruhleder,
1996; Edwards et al., 2007; Edwards et al., 2009; Tilson et al., 2010). By this assumption,
IT systems develop locally—within single labs, for example—and suit the needs of their
initial set of users. Other organizations either simultaneously or sequentially develop their
own systems for carrying out work (Edwards et al., 2007). These IT systems develop
alongside social infrastructures, such as the norms of a community of practice or the
dynamics of the market, and thus become intertwined with the social infrastructure (Lee,
Dourish, and Mark, 2006). Over time, socio-technical arrangements arise, providing the
installed base for a digital infrastructure (Braa et al., 2007). For example, Lee et al.
(2006) found that biomedical researchers and statisticians working on a collaborative
project created new “work groups” to manage entry of data generated from the project
into a digital repository, partially by using existing social and professional relationships.
These non-technical coordination strategies allowed the repository to persist even when
the technical components of the infrastructure appeared incompatible with the
interdisciplinary project’s requirements.

Infrastructures take hold and flourish as use of the IT becomes intertwined with
these non-technical components of the infrastructure such as professional norms of
practice. This process appears to be common in contexts in which work crosses organizational boundaries and/or in which a societal-level goal exists, such as scientific research. In such contexts, the incentive to link technologies to one another grows as installed IT becomes capable of helping reach widely-held goals. Borgman (2010) provided a good example in her exploration of the Human Genome Project. The project prompted the rapid development of IT systems capable of storing, exchanging, and analyzing genomic data, experimental protocols, computer code, and other materials across a consortium of science labs at universities worldwide (Borgman, 2010). Genomics researchers maintained their own systems in their own labs prior to the project, but began developing ways to share with collaborators as interest in sequencing the human genome increased. Because scientists live in “small worlds” in which each scientist is only a few intermediaries removed from any given peer (Newman, 2001: 404), norms of data sharing developed quickly. Still, standardization occurred slowly. In 2014, nearly 30 years after the Human Genome Project officially began, the U.S. National Institutes of Health released a Genomic Data Sharing policy, developed largely through adopting the standards geneticists had evolved among themselves (NIH, 2014).

In the Human Genome Project and other cases, the development of digital infrastructures occurred gradually. The success of such projects drove researchers to adopt gradual growth as an assumed characteristic of all digital infrastructures and recognize gradual development as a best practice (Barrett et al., 2015; Henfridsson and Bygstad, 2013; Tilson et al., 2010). Theories of new IT implementations support the idea
that gradual diffusion of new IT can help to diminish the possibility of resistance to the IT for several reasons. First, organizations experience positive implementation outcomes when they carefully choose an IT that suits their structures, processes, and work practices (Frambach and Schillewaert, 2002; Melville et al., 2004), an idea sometimes referred to as organization-technology fit (e.g., Strong and Volkoff, 2010). Scholars of new IT implementations have routinely demonstrated that selecting an IT that is sensitive to local realities reduces friction between existing practices and the new practices required for IT use (Dishaw and Strong, 1999; Goodhue and Thompson, 1995; Lin and Huang, 2008; Sorge, 1991; Yusof et al., 2008; Zigurs and Buckland, 1998). Furthermore, involvement of workers in the IT selection process is widely considered an implementation best practice because it grants workers a sense of control over the adoption decision (Lawler, 1992; Lin, 2003; Rogers, 1983). Gradual development of digital infrastructures leaves organizations with the time to make these careful decisions and to grant workers the opportunity to give input into the decision, which promotes positive responses when the IT is deployed.

**Participation in Digital Infrastructure Development is Voluntary**

A second, related reason that resistance does not appear in existing studies of digital infrastructure development is that participation in the infrastructures studied was consistently voluntary. In other words, organizations decided to adopt digital infrastructure IT in order to achieve an organizational goal, such as innovation (e.g., Star and Ruhleder, 1996), efficiency (e.g., Zimmerman and Horan, 2004), or improved ability
to collaborate with other organizations (e.g., Lynch, 2003). This assumption originated from what Henfridsson and Bygstad (2013) referred to as “relational models” of digital infrastructure development, a perspective that hinges upon the idea that stakeholders and users exert some degree of agency over the processes involved in digital infrastructure development. Whereas many infrastructure development perspectives drew on actor-network theory, this body of research adopted theories of learning and work practices as its principal analytical lenses (Engeström, 1990; Lave and Wenger, 1991). For example, Star and Ruhleder (1996) contended that digital infrastructure is relational in that its core technologies and the practices required to use them become meaningful only as they are used in practice, when users begin to come to agreements about how the digital infrastructure can/should develop. Infrastructure governance, then, is agreed upon as certain uses of the technology are repeated and accepted in a given community of practice (Pipek and Wulf, 2009). As Vaast and Walsham (2009: 547) noted, accepted IT uses must come to be “supported by the local universality of an information infrastructure … embedded with other infrastructures.” From this view, how an organization, group, or individual decides to engage with a digital infrastructure is voluntary.

**Governance of Digital Infrastructures is Decentralized**

The third characteristic of digital infrastructures that reduces the likelihood of resistance appearing in the existing literature relates to control over the growth and use of the infrastructure. The infrastructures studied to date have had no one actor coordinating governance of the infrastructure; rather, governance structures have tended to emerge
through a process by which heterogeneous and autonomous human or organizational actors developed patterns of use of IT through their adaptation to each other and their external environments (Braa et al., 2007; Ciborra and Failla, 2000; Hanseth et al., 2006). In this sense, digital infrastructure governance has been assumed to be decentralized because organizations, groups, and individuals can set their own rules prior to the emergence of a connected infrastructure.

Standardization eventually becomes a logical step in expanding the capabilities of a single IT system under decentralized governance, sparking a process of negotiation among stakeholders in the infrastructure’s development (Edwards et al., 2007; Edwards et al., 2009; Constantinides and Barrett, 2006). To contend with issues related to digital infrastructure standardization, researchers have proposed both top-down and bottom-up views (Barrett et al., 2015). The less-developed top-down approach argued that infrastructure development requires a highly-coordinated IT governance framework providing guidelines for decision making (Weill and Ross, 2004). This body of research, although mostly rejected by infrastructure researchers (e.g., Edwards et al. 2007; Star and Ruhleder 1996), offers some insight into what effective strategies for guiding the development of an infrastructure looks like. For example, Brown and Wyatt (2010) argued that organizations like the Rockefeller Foundation can and do provide top-down support and direction to drive infrastructure innovations. They also note that the effectiveness of these efforts often relies on the various, locally situated implementers of the innovations.
As Barrett et al. (2015) noted, researchers holding a top-down perspective largely sought to develop governance frameworks through interviews and surveys with top executives or managers (Dean and Sharfman, 1996; Devaraj and Kohli, 2003; Sambamurthy and Zmud, 1999); as a result, the frameworks were somewhat biased toward increased control as opposed to other infrastructure goals such as innovation and creativity. Indeed, digital infrastructure research writ broadly has told us that top-down control is not always possible or effective (Constantinides and Barrett, 2014).

Furthermore, researchers routinely documented instances in which centralized development of technological systems failed to reach intended goals (e.g., Adler-Milstein et al., 2008; Beynon-Davies, 1995; Currie and Guah, 2007; Heeks, 2006; Lucas, 1975b; Lyytinen and Hirschheim. 1988).

Digital infrastructure researchers largely accepted, then, that an information infrastructure’s development can never be completely controlled because it constantly grows in complexity and deviates from the original intentions of designers (Axelrod and Cohen, 2000; Ciborra and Andreu, 2001; Edwards et al., 2007; Hanseth and Lyytinen, 2010; Sahay, Monteiro, and Aanestad, 2009). Market shifts, technological innovations, changing social norms, and resistance by the users of the technology result in unintended consequences of implementation (Hanseth et al., 2006), often leading to failed investments rather than desired implementation goals (Barker and Frolick, 2003; Ciborra, 2001). Therefore, several researchers posited that infrastructures should be developed from the bottom up and began developing frameworks and strategies for facilitating
decentralized growth (Barrett et al., 2015; Hanseth and Lyytinen, 2010; Sahay et al., 2009).

Decentralized strategies for growth of an infrastructure enable individual organizations to decide when to adopt IT, which IT to adopt, and how to implement it. Authors have also documented the importance of decision-makers exerting control over the infrastructure’s design (Hanseth and Lyytinen, 2010). Following this logic, researchers often proposed sets of “design principles” and associated “design rules,” while “observing pivotal relationships between technical and social elements, and their dynamic interactions” (Hanseth and Lyytinen, 2010: 15). Subsequent theories explaining the outcomes of these design approaches assumed that bottom-up adaptations—ongoing interactions between IT designers and users that shape the trajectory of infrastructure development—take over after implementation (Henfridsson and Bygstad, 2013). The central argument of this research stream is that design choices should seek to provide “generative mechanisms” that, over time, scale up (Henfridsson and Bygstad, 2013: 897). Generative mechanisms are avenues for creating and growing digital infrastructures that establish a balance between control and innovation. For example, building infrastructures with malleable architectures allow various stakeholders in the infrastructure development to influence the design of the IT and its associated practices. This stream helps designers develop bottom-up design practices for infrastructures, but does not aid our understanding of how to effectively govern digital infrastructure development once the technologies are deployed (Barrett et al., 2015).
Braa et al. (2007: 3) coined the term “flexible standardization” to describe the process by which digital infrastructures could be governed in a decentralized and balanced manner. Flexible standardization involves accommodating the global needs of scalability of infrastructure standards as well as the local needs of sensitivity to contextual differences. In their case study, Braa et al. found that allowing local medical organizations in a developing country to slowly and autonomously adapt to shifting standards for health IT attracted more participants in the standards program and prevented the breakdown of local infrastructures when standards were incompatible with local conditions. These types of explanations, which scholars sometimes referred to as network models (Henfridsson and Bygstad, 2013) because they are largely rooted in the work of actor-network theorists such as Callon (1991) and Latour (1989), posited that networks of humans and technologies drive digital infrastructure creation, maintenance, and growth. Multiple human actors who design and execute digital infrastructure evolution “translate and inscribe” their interests and values into digital technologies that, once deployed, evolve within a complex network of human and nonhuman actors (Henfridsson and Bygstad, 2013: 909).

Examples of evolution within complex networks are well documented in the literature (e.g., Aanestad and Blegind Jensen, 2011; Constantinides and Barrett, 2006). In a study of a Norwegian healthcare digital infrastructure, Hanseth and Monteiro (1997) explained how barriers to end-user involvement were inscribed by human actors involved in the design of medical recordkeeping standards. These barriers, the authors claimed,
were the result of an actor network beyond any single stakeholder’s control. The idea that all digital infrastructures take on a decentralized form of governance endures in contemporary research on digital infrastructure development.

The emphasis on bottom-up approaches reflects the history of digital infrastructure studies. Researchers conducted much of the seminal work on digital infrastructures, sometimes referred to in science and technology studies as cyberinfrastructures (Edwards et al. 2007; Star and Ruhleder 1996), in the context of scientific and academic research enterprises. This approach provided both opportunities and drawbacks for future studies of digital infrastructure governance. For instance, studying scientific communities such as biologists (Star and Ruhleder, 1996) provided a surefire way to observe and analyze distributed, interorganizational work. Few industries require as much exchange across organizational boundaries as the natural sciences. However, studying digital infrastructures in science limited future researchers because of the way in which the term “infrastructure” came to be defined. For example, Star and Ruhleder (1996: 113) stated that one characteristic of infrastructure is that it is “learned as a part of membership in a community of practice” and “links with conventions of practice.” From this view, then, governance of infrastructure development and use would occur through socialization and other bottom-up processes of initiation into a community of practice (e.g., Lave and Wenger 1991). In policy-driven IT implementations, IT are externally imposed on organizations and workers. Therefore, related assumptions borne
out of studies of infrastructures built from the bottom up are similarly problematic when evaluating tightly-controlled, top-down digital infrastructure implementations.

In sum, prior research on digital infrastructure assumed that infrastructure development is gradual, control over the infrastructure is decentralized, and use of the infrastructure is voluntary. In light of these assumptions, governance frameworks should be incremental, distributed, and unrestrictive. However, in some contexts—including several important public sector contexts—digital infrastructure development is rapid, control is highly centralized, and use is mandatory because the implementation is policy driven. Whereas the actors involved in prior infrastructure studies have embraced the infrastructures that they helped to create, actors who experience rapid, centralized, and mandatory implementation of digital infrastructures may resist, rather than embrace, the changes. Resistance is not a new topic for scholars of IT implementations, but, again, we will discover that existing conceptualizations rest on assumptions that are problematic in the case of policy-driven digital infrastructures.

CHARACTERISTICS OF RESISTANCE TO NEW IT IMPLEMENTATIONS

Existing research on new IT implementations in organizations holds its own set of assumptions about the process of introducing and integrating new IT into work processes and assessing the unintended consequences of implementation. Generally, researchers assume that the IT implementation process unfolds as depicted in Figure 1 (see below).

The first step is Phase 1, the Organizational Adoption Decision, in which organizational decision-makers select an IT based on the organization’s goals, budget,
existing work processes, and worker characteristics (Frambach and Schillewaert, 2002; Kurnia and Johnston, 2000; Roberts and Greenwood, 1997; Son and Benbasat, 2007). Adoption decisions are an important step in preventing potential resistance to IT. Decades of research demonstrated that including workers in the IT selection process promotes positive outcomes of implementation (Heracleous and Barrett, 2001; Kling, 1977; Newman and Noble, 1990). Managers of organizational IT implementations can make informed adoption decisions and develop locally-sensitive use policies to ensure that a single organization reaps maximum benefits from its IT (Damanpour, 1987; Frambach, 1993; Kimberley and Evanisko, 1981; Thong and Yap, 1995). They have no such control over policy-driven digital infrastructure decisions. Instead, single organizations and their managers are but small parts of a much larger, heterogeneous collection of organizations, regulatory agencies, designers, users, technologies, and policies involved in the implementation process (Barrett et al., 2015; Hagiu and Spulber, 2013; Parker and Van Alstyne, 2014; Vaast and Walsham, 2009).

In Phase 2, Implementation, managers and IT staff typically train workers to use the new IT and record any concerns workers might have about the impending change (Fixsen et al., 2005; Jasperson et al., 2005; Kumar et al., 2003; Orlikowski, 1992). Studies have documented the positive impact that thorough training and sensitive feedback mechanisms (enabling workers to shape implementation) in this phase can have on workers’ perceptions of new IT and their acceptance or rejection of IT or any other
new innovation (Amoako-Gyampah and Salam, 2004; Cooper and Zmud, 1990; Klein and Sorra, 1996; Sharma and Yetton, 2007).

Figure 1: New IT Implementation in Organizations

Phase 3, Acceptance, Rejection, and Use, is the point at which resistance to the implementation is typically documented. The new IT that an organization chooses and its proposed uses do not always align with the organization’s structure, the realities of group interactions, or individual workers’ everyday practices and routines (Edmondson, 1999; Edmondson et al., 2001; Feldman and Pentland, 2003; Leonard-Barton, 1988). Therefore, we might expect to see organizations and workers resisting digital infrastructure IT implementations that attempt to intervene in day-to-day practice as workers engage in actions to reconcile existing structures, processes, and practices with the requirements of the new technology as it comes into use (Berente and Yoo, 2012; Leonardi, 2007). In short, workers’ actions that defy the organization’s implementation goals constitute
“rejection” and may prompt negative organizational outcomes; workers’ actions that fulfill the goals constitute “acceptance” of the technology and may promote positive organizational outcomes (Agarwal and Prasad, 1997; Burkhardt, 1994; Igbaria et al., 1996; Iivari, 1995; Jaspersen et al., 2005; Kraut et al., 1998; Taylor and Todd, 1995a).

Models and theories that successfully predict acceptance behaviors in the Use phase are largely cognitive-based models, such as the technology acceptance model (Davis, 1989; Davis et al., 1992; Venkatesh and Davis, 2000), the unified theory of acceptance and use of technology (Venkatesh et al., 2003), technology and innovation diffusion theories (Cooper and Zmud, 1990; Lewis and Seibold, 1996; Johnson and Rice, 1987; Rice and Rogers, 1980; Rogers, 1983; von Hippel, 1988), the decomposed theory of planned behavior (Taylor and Todd, 1995a), and social cognitive theory (Compeau, Higgins, and Huff, 1999). Although diverse, these models and theories share an important assumption: Individual perceptions and beliefs about a technology determine the degree to which a worker will use a new technology (Beaudry and Pinsonneault, 2005; Fulk, 1993; Jaspersen et al., 2005; Saga and Zmud, 1993). These perceptions and beliefs include effort and performance expectancy (Venkatesh et al., 2003), perceived compatibility (Agarwal and Prasad, 1997; Taylor and Todd, 1995b; Xia and Lee, 2000), experience and history with using technology (Majchrzak et al., 2000; Triandis, 1980), and relative advantage (Iivari, 1996).

When perceptions and beliefs about IT use conflict with an individual’s or group’s beliefs, values, and existing practices, acceptance is unlikely. Instead, workers
are prone to resist the new technology because they perceive it as a threat to their existing role and practices (Markus, 1983). Resistance fascinates IS scholars in part because it stands in the way of implementation goals (Carroll and Fidock, 2011). Furthermore, resistance involves factors that, as compared to the cognitive factors that influence acceptance, are unpredictable, yet lead to profound organizational consequences (Barker and Frolick, 2003; Lapointe and Rivard, 2005). For example, whereas technology acceptance models (e.g., Davis et al., 1989) might predict that workers will embrace a new technology by using its full set of features, no such models exist that predict the degree to which individuals and groups engage in resistance behaviors nor do any predict what the resistance behaviors might be (e.g., sabotage vs. passive resistance). Below, I review the research on resistance to new IT to establish a foundation for what we know about defining resistance, identifying its antecedents, and predicting or evaluating its outcomes. Along the way, I point out how current understandings of resistance might be limited in that they focus solely on activities at the point of IT use, which may be rendered obsolete in policy-driven IT implementations.

Scholars of IT implementations offer various definitions of resistance, which generally take one of three orientations: negative, positive, or neutral. Negative definitions of resistance are perhaps the most intuitive of the three views and imply that any action that conflicts with the goals of the technology implementation is a barrier to success. For example, Ansoff (1988: 207) defined resistance as “a multifaceted phenomenon which brings forth unanticipated delays, costs and instabilities into the
process of strategic change.” Similarly, Hirschheim and Newman (1988) added the element of intentionality and defines resistance as intentional acts or commission that defy the wishes of others. Less often, IT implementation researchers positively construe resistance as a learning opportunity. As Markus (1983) suggested, resistance is not a problem to be solved; rather, it serves as useful insight into the technology’s limitations. Neutral definitions of resistance also exist, such as Zaltman and Duncan’s (1977: 63) contention that resistance is “any conduct that serves to maintain the status quo in the face of pressure to change it.”

Strong management and commitment from workers can usher in new organizational structures, processes, and practices that overcome resistance and promote the use of a new technology (Garud and Nayyar, 1994; Liang et al., 2007). More often, though, workers adapt technology use and existing practices to fit one another, developing hybrid actions that accommodate both old and new ways of carrying out work (Berente and Yoo, 2012; Halbesleben et al., 2008). During this process, workers develop behaviors such as “workarounds” to satisfy the requirements of IT use and preserve the fundamental aspects of their existing practices and routines (Azad and King, 2008; Ferneley and Sobreperez, 2006; Halbesleben et al., 2008; Halbesleben et al., 2010; Koppel et al., 2008; Pollock, 2005; Suchman, 1987). For example, in a qualitative study of NASA’s implementation of a new ERP system, Berente and Yoo (2012) found that workers ran shadow systems to manage the inconsistencies between the ERP system’s budget reporting deadlines and the organic nature of scientific research funding needs.
This workaround satisfied the requirements of the system even though the technology was not integrated into the workflow as planned.

Aside from altering individual practices, IT use can also shape coordination and communication within and between groups by shifting communication patterns, altering advice networks, and redistributing power (Barley, 1986; Burkhardt and Brass, 1990; Leonardi, 2011; Volkoff, Strong, and Elmes, 2007). For example, Treem (2013) demonstrated how workers’ use of novel communication tools in a knowledge-intensive organization signaled technological proficiency to fellow workers and thus elevated their perceived status in the organization. New coordination and communication dynamics of this sort can ultimately alter the formal structure of the organization (Barley, 1990; Fry, 1982; Gattiker and Goodhue, 2005; Gerwin, 1979; Mohr, 1971; Mutch, 2002).

Because resistance can shape important organizational outcomes, researchers devote significant effort to developing concepts and theories that identify why resistance emerges and how it influences organizational outcomes. A commonly-identified origin of resistance is that workers are simply anxious about potential changes to their jobs (Beaudry and Pinsonneault, 2005; Lapointe and Rivard, 2005; Markus, 1983) or unsatisfied with the changes a new technology has introduced to their existing practices (Hiltz and Johnson, 1990; Maier et al., 2013). Other individual factors, such as previous experiences with technology (Marakas and Hornik, 1996) or effort expectancy (Venkatesh et al., 2003) also influence how a worker reacts when tasked with using a newly-implemented IT.
Researchers demonstrated how resistance can take many forms. Some authors distinguished among different types of resistance, such as active, passive, passive-aggressive, or aggressive and related them to the causes severity of resistance (Kling and Iacono, 1984; Lapointe and Rivard, 2005). Each of these forms of resistance occurs at the local level. Some forms of resistance may demonstrate overt cooperation and acceptance of the IT, but, through subtle actions such as delaying adoption of the technology or convincing coworkers of the technology’s shortcomings, sabotage of the implementation effort (e.g., Marakas and Hornik, 1996). Other, more active forms of resistance may emerge when passive resistance is insufficient or when the fear and stress that drive passive resistance demand deliberate action (Bardach, 1977). However, the distinctions between different forms of resistance are not as important as the commonalities in their origins and outcomes. As Keen (1981: 28) explained, resistance is,

... a signal from a system in equilibrium that the costs of change are perceived as greater than the likely benefits. The bringers and sellers of change—academics, computer specialists, and consultants—assume that what they offer is good. In practice, there are many valid reasons to go beyond passive resistance and actively try to prevent implementation. Many innovations are dumb ideas. Others threaten the interests of individuals and groups by intruding on their territory, limiting their autonomy, reducing their influence, or adding to their workload.

At the heart of this explanation and others is the idea that implementations necessarily engender changes in the day-to-day lives of workers and that these changes may or may not be welcomed. Markus (1983), for example, explicitly defined resistance as an interaction between the system being implemented and the context of use. Actors
assess the interaction and decide to use the system if it supports their position of power; if, on the other hand, they perceive a threat of losing power post-implementation, they will resist. Building on this idea, Joshi (1991) developed the equity-implementation model (EIM) to explain and predict resistance to a new technology. The EIM holds that workers assess the changes related to a new IT implementation by evaluating the net equity, or the difference between changes in outcomes and changes in inputs with the new IT. Net inequity—having to put in more work to get equal or less benefit—engenders resistance from workers. In this sense, EIM is a cost-benefit analysis of the change done on an individual-to-individual basis. However, the model has not been empirically validated and is largely cognitive in nature. Its cognitive tendency presents questions about how far into the future workers consider when assessing costs and benefits and, more importantly, about the role of social factors in driving resistance.

Scholars also acknowledge that resistance can emerge at the group and organizational levels, and that resistance actions at these levels can interact with one another (Lapointe and Rivard, 2005). For example, individuals may look to their peers when making decisions about IT use, which generates group responses that can diffuse across the organization. Often, workers adapt to these changes and the implementation succeeds after a period of adjustment. Barley (1986), for example, explained how the initial introduction of CT scanners in radiology departments threatened the role distinctions between radiologists and technicians, but, over time, patterns of interaction stabilized and roles were preserved.
To date, accounts of resistance to technology implementations have taken a localized perspective to account for this diversity of influences on resistance behaviors. The reasons behind existing theories’ tendency to attribute resistance to localized sources and to explore its localized outcomes are both methodological and theoretical. Methodologically, most accounts of resistance to technology implementations were case studies of single organizations or small sets of organizations that independently decided which IT to implement, how to implement it, and what to do when problems arose. According to theories of diffusion, firms necessarily act at different points in time with regard to technology adoption (Attewell, 1992; Fichman, 1992; Keller, 2004). Therefore, researchers tended to bound their documentation of activities around the implementation to the confines of the organization. For example, Boudreau and Robey (2005), in their study of a government-mandated ERP implementation in a government agency, developed the concept of improvised learning to explain how workers’ enactment of a technology changes over the course of implementation; their study focused exclusively on how workers’ perceptions and actions were shaped by their collocated peers. In this case and others, researchers adopted a localized perspective, studying implementation projects in solitary agencies such as NASA (Berente and Yoo, 2012). In rare cases, researchers undertook projects that compared IT outcomes at multiple sites, such as Barley’s (1986) study of two hospitals implementing CT scanners and Edmondson et al.’s (2001) study of a set of sixteen hospitals implementing new surgical technologies. Even when scholars undertook these larger studies, the focus remained on resistance
within each site and did not extend to coordinated, national resistance that might occur beyond the boundaries of the organization. This limited focus arose in large part because no such resistance existed, as traditional avenues for resistance—within the organization—were effective to achieve desired IT outcomes by influencing local decision-makers.

The methodological tendency to study local sources and outcomes of resistance reflects and perpetuates a theoretical shift in the study of technology and work, a shift that has hampered IS scholars’ ability to account for forms of resistance that take place beyond the point of technology use. Namely, this research stream continues to shift from a technological deterministic stance toward technology outcomes to a view that acknowledges how most technology outcomes are socially constructed (cf., Bailey and Leonardi, 2015). From the deterministic view, studies treated technology as a causal, unidirectional impact on the organization (Gosain, 2004; Hughes, 1986; Kallinikos, 2004). In these cases, researchers deemed the outcomes of technology implementation, including resistance, as universal. Bailey and Leonardi (2015: 23) explained that the deterministic view assumes technology necessarily shapes organizational structure, portraying technology as an independent variable, and structure as a dependent variable. In other words, a certain type of technology engenders particular outcomes no matter the context in which it is deployed. But scholars largely moved away from this deterministic stance by examining contradictory findings about the outcomes associated with computing technology implementations. Particularly, scholars engaged in a back-and-
forth debate over whether computers necessarily centralize decision-making authority (Leavitt and Whisler, 1952) or decentralize decision-making authority (Blau et al., 1976; Klatzky, 1970). In recent decades, scholars recognized that the context of technology implementations—including pluralistic social, political, organizational, occupational, and individual factors—shapes all outcomes (Avgerou, 2001; Barley, 1986, 1990; Bijker and Law, 1992; Leonardi, 2007, 2011, 2013; Orlikowski, 1992, 2000; Orlikowski and Barley, 2001; Oudshoorn and Pinch, 2003), resulting in the downfall of deterministic arguments.

That is, contemporary organization and IS theories recognize that the results of implementation will depend on how the technology fits within social structures of the organization (Scott, 2001) and with the profile of the workers using it (Davis, 1989; Venkatesh and Davis, 2000; Venkatesh et al., 2003), among other factors. In turn, researchers dedicate significant portions of their studies to describing and analyzing contextual factors that influence resistance (Avgerou, 2001; Brown, 1999; Brown and McGill, 1998; Chiasson and Davidson, 2004; Lee and Ngwenyama, 1997). Scholars’ emphasis on context has contributed to a proliferation of localized explanations, or explanations that point to site-specific factors that generate workers’ resistance to technology. In other words, a social constructionist approach rests on the assumption that any meaningful resistance to technology will occur at the point of use and manifest itself in the day-to-day activities of the workers (Klein and Kleinman, 2002; Leonardi and Barley, 2010; Monteiro and Hanseth, 1996).
In sum, the methodological tendency to focus on local sources and outcomes of resistance, paired with the theoretical assumption that all meaningful resistance occurs at the local level, hinders our ability to explain resistance that occurs beyond the point of use. Practically, this gap in the literature is important to address because the opportunities for organizations and managers to respond to resistance in policy-driven IT implementations will, as I argue in this study, differ from the responses depicted in Phase 4 of Figure 1 (customization or replacement). Despite scholars’ recognition that implementation of even the most promising technology does not ensure universal outcomes, federal governments and industry leaders continue to offer up—and even mandate—technological solutions to some of society’s most pressing issues. Indeed, technological determinism is alive and well outside of academia, as evidenced, for example, in Manyika et al.’s (2011) report touting the potential of Big Data analytics for revolutionizing a wide array of industries. As government agencies demand the application of such technologies to transform sectors including education and healthcare, organizations may have little or no choice in IT adoption, implementation, and customization decisions, and workers may be required to use the IT in specific, policy-compliant ways. In other words, localized resistance is futile because decisions about digital infrastructures are made at the state or federal level, rather than at the organizational level.

If theories about technology and work are to contend with governmental, wide-reaching efforts to solve societally-important problems with digital infrastructure IT,
scholars must conduct comprehensive analyses of industries that are rapidly implementing technological solutions to document and explain resistance beyond the local level. Unlike organizational IT implementations, generally, and digital infrastructure IT implementations in scientific and academic research, specifically, policy-driven digital infrastructure development programs drastically reduce the autonomy of organizations, managers, and workers over the course of the implementation process. In addition, these programs promote the rapid and simultaneous implementation of the same or very similar IT across a wide swath of organizations. And finally, participation in the infrastructure is mandatory (i.e., non-participation has explicit financial penalties). The policies that regulate infrastructure development are developed centrally by state and federal governments. These conditions make it likely that policy-driven digital infrastructure development efforts will encounter resistance that is novel in relation to the localized resistance described above. To guide my inquiry into how organizations and workers contend with policy-driven digital infrastructure implementation and diminished autonomy over IT decisions, I ask the following research questions:

**RQ1**: In the absence of the ability to make IT adoption, implementation, and use decisions, what are the strategies managers use to manage workers’ IT use?

**RQ2**: In the absence of the ability to resist IT locally, how do workers resist policy-driven digital infrastructure IT implementations?
To begin assessing these questions, I explore two theories that IT implementation researchers sometimes employ to account for factors beyond the boundaries of organizations that influence IT implementation outcomes.

**BEYOND LOCALIZED RESISTANCE: WHY AND HOW MIGHT WORKERS RESIST POLICY-DRIVEN DIGITAL INFRASTRUCTURES?**

The first theory that may lend insight into why and how resistance emerges in response to policy-driven IT implementations—institutional theory—construes technology implementations as a potential source of institutional change. Institutions are predefined patterns of conduct that individuals draw upon to guide their every day practices (Berger and Luckman, 1967). The theory predicts that any attempt to change these patterns of conduct will necessarily be slow and gradual, and likely met with resistance. I explore the possibility of using institutional theory to accommodate the influence of external sources of change on digital infrastructure development. The second theory, social movement theory, typically treats new IT as a tool for manifesting resistance, whereby the technology enables dissidents to communicate and organize with one another. But it also provides concepts for exploring how workers might extend beyond localized resistance in response to new IT implementations. I explore the potential for applying social movement theory in an alternative way below.
Institutional Theory

Institutions include the taken-for-granted beliefs and practices that prevail in given social contexts among members of particular groups who belong to or identify with the institution (Avgerou, 2001; Thornton and Ocasio, 2008; Thornton, Ocasio, and Lounsbury, 2012). For example, the institution of medicine contains deeply-rooted beliefs (e.g., paternalism and the sanctity of the doctor-patient relationship) and practices (e.g., doctor-patient confidentiality) that guide the actions of healthcare workers. In this way, institutions provide meaning (Thornton and Ocasio, 1999), structure the attention of actors (Lounsbury, 2007), signal appropriateness (Thornton and Ocasio, 2008), and define the rules of play (Dunn and Jones, 2010; Orlikowski and Barley, 2001). Selznick (1957) claimed that institutions are necessarily infused with values. Sometimes, these values and the institutions that represent them are so deeply embedded in society that they are perceived as unchangeable and even as morally appropriate (Deephouse and Suchman, 2008), as evidenced by the difficulty experienced in trying to change deeply-embedded institutions such as marriage.

Yet, institutions do change. Institutional theorists contend that institutional change occurs slowly and gradually through isomorphism, whereby organizations in the same institutional field experience the same regulatory and market pressures and therefore tend to look more and more alike in structure over time (Deephouse, 1996). Attempts to quickly transform or replace prevailing institutions, then, are never easily realized, and any attempt to change an institution will likely be met with resistance (Greenwood et al.,
Actors attempting to change institutions may, therefore, find themselves operating in a “hostile normative environment” (Hiatt, Sine, and Tolbert, 2009: 641) because the targets of their initiatives are deeply embedded in dominating institutions. The targets of change perceive the prevailing values, beliefs, and practices as legitimate (Battilana, Leca, and Boxenbaum, 2009). Furthermore, because the targets of change may draw their identity from those institutions (Rao, Monin, and Durand, 2003: 796) and profit by the maintenance of the status quo (DiMaggio, 1988), they may resist the alternative identity prescriptions or practical implications of an institutional shift (Lok, 2010). Bourdieu (1977: 196) described institutional shifts as “symbolic violence” because they represent a “gentle, hidden form which violence takes when overt violence is impossible.”

Scholars of IT implementations have employed institutional theory in studies of technology implementation. Institutional analyses of such implementations typically portray the new technology as the material representation of an institutional change effort (Avgerou, 2000; Berente and Yoo, 2012; Greenwood, Suddaby, and Hinings, 2002; Smets, Morris, and Greenwood, 2012). Often, the impetus for IT-based institutional change originates from outside of the organization. For example, Pollock and Cornford (2004) demonstrated how universities in the United Kingdom conformed to the best practices of organizations in other industries by implementing enterprise resource planning (ERP) systems. Unsurprisingly, many workers in the university that Pollock and
Cornford studied resisted the new technology because they viewed academic institutions as inherently unique and unamenable to shifting corporate norms.

Explanations from this line of research often argued that IT adoption decisions are important and may be sources of resistance because new technologies carry with them institutional logics from the contexts in which they were developed (Berente and Yoo, 2012; Thornton and Ocasio, 2008). Institutional logics are scripts for behavior that are associated with a particular institution (Berente and Yoo, 2012). As demonstrated in the case of U.K. higher education, the institutional logics embedded in a new technology may or may not align with the existing logics of workers. When conflicts arise between new logics and existing logics, workers are likely to resist the change (Thornton and Ocasio, 2008; Yoo et al., 2012). Institutional logics helped to couch the existing values and practices that shape workers’ and organizations’ decisions and practices within their broader institutional, political, and social settings. Logics serve to make the new values and practices associated with the new IT easy to compare and contrast with existing values and practices. However, institutional analyses largely turn inward and identify local forms of resistance, such as workarounds, instead of considering alternative forms of resistance that are situated outside of the organization.

How does this understanding of resistance build upon existing explanations of individual and group resistance? First, it recognizes that forces beyond the boundaries of the organization can influence technology outcomes. Institutional theory evaluates how various forces in a given institutional field can shape organizations’ decisions at the
beginning of the process (e.g., adoption), but tells us little about activities that occur non-locally following the implementation. Because institutional fields are diverse—they contain many organizations and relations—individuals are subjected to multiple, competing logics in choosing how they carry out their work.

According to institutional theorists, institutions only change “when organized actors with sufficient resources see in them an opportunity to realize interests that they value highly” (DiMaggio, 1988: 14). In successful cases of change, institutional change processes reshape actors’ identities and bind them to alternative values, beliefs, and practices (Greenwood et al., 2002; Lok, 2010, Rao et al., 2003). So how do institutions change? By definition, institutional change occurs when taken-for-granted values, beliefs, and practices are transformed or defeated and replaced (Battilana et al., 2009). Such change processes obviously require agency—someone has to destabilize the prevailing institutions and propose and advance alternatives. However, it is not yet clear what exactly agency means with regard to change processes. Institutional change is typically interpreted as a process in which change is driven by coalitions of powerful actors. The reason for emphasis on powerful actors is obvious: as noted above, change can be risky and costly, so change agents need the support of other actors who already perceived as legitimate (Galaskiewicz, 1985; Brass et al., 2004), who possess higher status within the system (Battilana, 2006), and who can “make inroads among elites, who represent more legitimate sources for providing alternative frames” (Wolfsfeld, 1997: 29).
Some authors have deemed existing views to be too rational and simplistic, and have highlighted the need to develop more nuanced discussions of institutional change that account for various types of actors and their role in institutional change processes (Lok, 2010; Greenwood et al., 2002). In light of this recognition, institutional theorists are shifting away from viewing individuals simply as “accomplice[s] to social processes of institutionalization and structuration” to viewing them as “agent[s] whose motivations, behaviors, and relationships are of direct, rather than indirect, interest and attention” (Lawrence, Suddaby, & Leca, 2011: 55). According to these accounts, individuals and groups of individuals—no matter their position in social hierarchies or their degree of control over resources—can create, disrupt, and maintain institutions (Lawrence et al., 2009), including those associated with new technologies. As Orlikowski (2000: 407) explains,

...while users can and do use technologies as they were designed, they also can and do circumvent inscribed ways of using the technologies—either ignoring certain properties of the technology, working around them, or inventing new ones that may go beyond or even contradict designers’ expectations and inscriptions.

When individuals and groups engage in such technology uses in patterned ways, the uses gain legitimacy and can become institutionalized, thus giving various types of actors the ability to change institutions (Lok, 2010).

**Social Movement Theory**

Social movement theory echoes many of the assumptions made by institutional theory, but stands to provide a richer understanding of the implementation of digital
infrastructures by explaining how change is resisted, not just originated, by groups of actors. Social movement theory focuses on how collective behavior emerges in response to political, social, and cultural conditions. Social movements can either initiate change to long-standing conditions, as in the case of activism (Kurzman, 1996; Wiktorowicz, 2004), or resist proposed changes, as in the case of protest (Benford and Snow, 2000; Hunt et al., 1994; Johnston and Noakes, 2005; Snow and Benford, 1992). Although there is no universal model of social movement theory, several key concepts underlie the work of the sociologists and psychologists who study the origins, development, and outcomes of collective action: relative deprivation, resource mobilization, and political opportunity structures. Each of these concepts can aid our understanding of why and how workers might resist policy-driven digital infrastructure development.

*Relative deprivation* refers to the idea that people’s participation in social movements arises out of a sense of inequity or inequality (Gurr, 1970; Meyer, 2004). Movements originate, for example, when individuals or groups recognize that other individual groups hold more power, economic resources, or status. Sensing a need to equalize power, resources, or status, these actors develop strategies for raising their position (Meyer, 2004). But relative deprivation need not be relative to other individuals or groups (Davies, 1962). Instead, actors might sense that their satisfaction with current day-to-day experiences (or potential experiences) is declining relative to past experiences (Davies, 1962; Gurr, 1970). Upon realizing a declining situation, actors look for avenues to improve it and align realities with their expectations, often by joining movements.
Relative deprivation constitutes an important aspect of participants’ cultural frames, or the sets of universally-applicable claims that activists deploy to gain the attention, consideration, and support of various audiences (e.g., media outlets, powerful social groups, or groups experiencing similar situations) (Benford and Snow, 2000).

Individuals and groups that sense relative deprivation can improve their situation by mobilizing resources. The concept of resource mobilization rests on the assumption that social movements necessarily depend on organization (McAdam et al., 1996). Once organized, participants in the movement can acquire and then deploy resources to achieve their well-defined goals. Scholars have suggested a typology of five types of resources: material resources, or money and physical capital; moral resources, or solidarity and support for the movement’s goals; social-organizational resources, or organizational strategies, social networks, and avenues for recruitment; human resources, or volunteers, staff, and leaders; and cultural capital, or prior activist experience, understanding of the issues, and ability to collectively organize (Morris, 1981). Groups with access to these types of resources are likely to develop a strong social movement capable of initiating or resisting change (Snow et al., 1980).

Finally, the outcomes of social movements often depend on the availability of political opportunity structures. The concept of political opportunity structures implies that certain political contexts are conducive to social movement activity (Morris, 2000; Sabel, 1982; Tarrow, 1994). Political opportunities may be realized when potential
activists recognize favorable conditions for collective action, including political concessions, increased social movement participation by others, or the founding of organizations dedicated to furthering the social movement (Tarrow, 1994). Opportunities may include increased access to political decision making power, instability in the alignment of ruling elites (or conflict between elites), access to elite allies (who can then help a movement in its struggle), and diminished governmental ability or willingness capacity to repress dissent (Morris, 2000).

These concepts are applicable to understanding workers’ resistance to technology implementations, particularly those that are driven by government policy, because they reveal the avenues that workers might use to resist IT when local avenues fail. However, they have yet to be applied in great depth. In fact, the few IS studies that employ social movement theory cast technology as a mobilizing structure or political opportunity structure (e.g., Kelly Garrett, 2006; Van Aelst and Walgrave, 2002). That is, technology is construed as a way to express resistance and organize the social movement, as in the case of the use of social media to organize events and demonstrations during political regime change in Egypt (Eltantawy and Wiest, 2011). Applying these concepts in an alternative way—specifically, construing the technology as a cause of discontent rather than an outlet for it—could help to understand how resistance emerges in response to digital infrastructure development.
Chapter 3: Methods: A Qualitative Approach to Studying Mandated IT Implementation in the U.S. Healthcare Industry

In this chapter, I describe the methods I used to collect and analyze data to answer the research questions presented in Chapter 2. I begin by describing the setting for the study, including an explanation of the U.S. federal EMR program, and explain the sources of data and how I collected each of them. I then detail my method for analyzing the corpus of qualitative data.

Setting: Mandatory Digital Infrastructure IT Use in Healthcare—The Case of EMR

The ongoing implementation of EMR in the U.S. healthcare industry serves as an ideal context for investigating questions related to resistance to policy-driven digital infrastructure implementation. The industry is currently undergoing a federally-mandated transition from paper-based patient records to EMR. U.S. policymakers initiated this transition because they saw Medicare and Medicaid operational inefficiencies as key issues in the ailing health system and in the overall economic crisis (“The Great Recession”) that spanned the latter half of the 2000s. In response, the Obama administration delegated funds from the 2008 American Recovery and Reinvestment Act stimulus package to programs aimed at improving both financial efficiency and patient care in the U.S. health system. At the center of this plan was the EMR mandate, which required all organizations that receive Medicare and Medicaid payments—over a million hospitals and practices (CMS, 2015)—to adopt and use EMR. Regulators hoped pervasive EMR adoption and use would enable the construction of a national healthcare
information exchange, providing the digital infrastructure for large-scale analysis of patient data.

Supporters of this goal drew on arguments from the evidence-based medicine movement of the 1980s and 1990s (e.g., Sackett et. al 1996) and posited that EMR data, other diagnostic and treatment data (e.g., lab tests, pharmaceutical prescriptions), data from randomized controlled trials, and data from lab results provided a corpus of the “best available evidence” for medical practice. They argued that efficiency and quality improvements are attainable through careful analysis of these data using machine learning, natural language processing, data visualization, and other techniques (Hillestad et al., 2005; Ohno-Machado et al., 2015; Simpao et al., 2014). Larson (2013), for example, noted that mining huge data sets of routine healthcare data from a large percentage of the population might yield in a matter of months results that once required decades of research trials conducted on selected samples of patients, with more generalizable results. EMR databases, consisting of quantitative data (e.g., a patient’s laboratory results), qualitative data (e.g., text-based documents and demographic information), and transactional data (e.g., records of medication delivery), are rich with the type of information that might aid such an analysis.

The federal program included at least two steps for attaining efficiency and quality goals. First, the plan promoted the rapid uptake of systems that are capable of capturing, storing, and processing data in ways that can help guide healthcare organizations’ financial decisions, treatment decisions, patient intake/output, and
workflow design. The construction of a national healthcare information exchange necessitated that these technologies be interoperable, or capable of transmitting data and information between organizations without losing clinical value in the process (HIMSS, 2009).

The federal government’s investment sparked a massive increase in adoption rates of EMR technologies by distributing incentive payments to eligible practices and hospitals between 2010 and 2015 to cover the costs of adopting and implementing EMR. Of the $155 billion allocated to healthcare in the stimulus package, over $26 billion went to the Health Information Technology for Economic and Clinical Health (HITECH) Act. Between 2011 and 2014, recipients of Medicare EMR incentives collectively received more than $16 billion, while recipients of Medicaid incentives received more than $8 billion—a combined $25 billion of federal funding—to implement EMR. The Center for Medicare and Medicaid Services distributed these allocations among over 500,000 practices and hospitals, representing a large portion of U.S. healthcare providers (CMS, 2015). These financial incentives totaled as much as $44,000 (through Medicare) and $63,750 (through Medicaid) per clinician (Blumenthal and Tavenner, 2010). Szlezák, Evers, Wang, and Pérez (2014) recently reported that at least 50% of U.S. physicians and 75% of U.S. hospitals had adopted EMR by 2012; a Center for Disease Control (CDC) (2014) survey indicates that over 78% of all healthcare providers now use EMR.

Eligibility for incentive payments depended upon organizations implementing technologies that meet the certification standards of the Office of the National
Coordinator (ONC) for Health Information Technology. Independent EMR vendors, which included Epic Systems, AllScripts, and Cerner, designed their systems to meet these federal standards “off the shelf.” Furthermore, vendors had to ensure that systems were interoperable with state and federal health databases. Therefore, once a healthcare organization adopted and implemented a specific EMR, it had little room for customization of the technology.

The HITECH Act was successful in raising adoption rates. But realizing the second goal of the federal government’s plan for an IT-led transformation proved difficult. In addition to promoting the widespread adoption of EMR, the government also set out to ensure that all data entered into the EMR—and, ultimately, into the national health information exchange—were accurate and reliable. Indeed, uniform use of the technology—or use that would support the collection of accurate and reliable data—was the explicit goal of the program’s designers. To arrive at these goals, policymakers mandated that EMR data must be collected and stored in standardized and interoperable ways, meaning healthcare workers must develop uniform practices. Standardization and interoperability were the drivers of HITECH’s four stages of “Meaningful Use” requirements, which healthcare organizations must meet each year (Murdoch and Detsky, 2013).

Meaningful Use was defined by the Centers for Medicare and Medicaid Services (CMS) in five areas: improving quality, safety, and efficiency and reducing health disparities; engaging patients and their families; improving care coordination; improving
population and public health; and ensuring adequate privacy and security protections for personal health information. Considering the goals together, CMS expected healthcare organizations and workers to use EMR in ways that contribute to high-quality data capture on a patient-by-patient basis, with the end goal to securely apply these data in public health decisions. Table 1 summarizes the practices associated with these five focus areas.
Adapted from CMS (2014)

<table>
<thead>
<tr>
<th>Focus Area</th>
<th>“Meaningful Use” Practices</th>
</tr>
</thead>
</table>
| Quality, Safety, Efficiency, and Reducing Health Disparities | Computerized Physician Order Entry (CPOE)  
Electronic Prescribing  
Maintain Problem, Medication, and Allergy Lists  
Record Demographics  
Record Vital Signs  
Record Smoking Status  
Drug Formulary Checks  
Incorporate Lab Results  
Patient Lists  
Send Reminders to Patients |
| Engage Patients and Their Families             | E-copy of Health Information  
Office Visit Summaries  
Patient Education Resources  
Timely Electronic Access  
E-Copy of Discharge Instructions |
| Improved Care Coordination                     | Medication Reconciliation  
Summary of Care at Transitions |
| Improve Population and Public Health           | Immunizations  
Syndromic Surveillance  
Reportable Lab Results |
| Ensure Adequate Privacy and Security Protections for Health Information | Protect Health Information |

Table 1: EMR Meaningful Use Focus Areas and Practices

The Meaningful Use standards in the righthand column of Table 1 satisfied Stage 1 of the program. In this stage, Meaningful Use was evaluated differently depending on whether the provider was an individual practice or a hospital. Practices had to report meaningful use via 15 core measures provided by CMS and a providers’ choice of 5 of 10 “menu measures,” leaving 20 total items. Hospitals had to report a total of 24 measures.
Under the program, the features of vendor-supplied EMR had to enable workers to meet Meaningful Use criteria. At the most basic level, EMR had to offer record-keeping and administrative (i.e., billing and payments) functions. HITECH legislation required that each patient in Medicare and Medicaid networks have an EMR on file and that a core set of personal information—age, gender, race and ethnicity, etc. are recorded (CMS, 2014). These record-keeping functions also included documentation of patient encounters, often with standardized fields for common consultations such as physicals. As early as 1994, researchers began developing controlled vocabularies for filling these fields (Cimino, 1994; Chute, Cohn, and Campbell, 1998; Humphreys, Lindberg, Schoolman, and Barnett, 1998) so as to promote interoperability of systems and sharing of patient-specific data between practitioners.

Beyond these record-keeping functions, a range of other features within the EMR supported compliance by providing general reference materials and guidelines based on the best available evidence. Documentation templates, for example, are simple electronic forms that draw the care team’s attention to particular aspects of the care situation (Ash et al., 2012), such as a series of patient-safety precautions to be completed before a surgery begins. Similarly, clinical protocols consist of action sequences for managing a specific patient condition, such as post-operative care for hip surgery. The protocols often include multi-disciplinary instructions, allowing nurses and allied health professionals to take physician-sanctioned actions without waiting for a direct order. These tools are typically
used in a supportive fashion and structure healthcare workers’ interaction with and treatment of patients.

Doctors, nurses, and other healthcare workers only use the above features of the EMR through deliberate access. Other features are intrusive in that they interrupt workers’ use of the EMR and require acknowledgement before the workers can proceed (Wright et al., 2011). For instance, alerts and reminders, also called “point of care electronic prompts” (Schwann et al., 2011: 869) appear in pop-up style windows, alerting physicians to errors or reminding them to order periodic screening exams. Many of these prescriptive tools compile and analyze an organization’s own EMR and external medical research data to provide these alerts, reminders, and recommendations (Mann, 2011). Researchers often refer to these tools as Clinical Decision Support (CDS) tools, which are most commonly accessed directly through the EMR. In an analysis of 11 such systems, Wright et al. (2011) identified and categorized 53 types of CDS tools (e.g., medication dosing and order support, point-of-care alerts, displays of relevant information, expert systems, and workflow support).

Currently, facility-specific policies determine how much latitude physicians retain in following or deviating from these decision support tools, but shifting payment structures and later stages of Meaningful Use suggest that application of the guidelines will become increasingly intrusive and prescriptive (Foote and Town, 2007; Miller, Brennan, and Milstein, 2009). Furthermore, the technological capabilities of EMR are rapidly expanding and moving practices closer to realizing the goals of HITECH and
other investments in the technology. To fully realize these goals, users of EMR must employ the technology in standardized, accurate ways.

Whereas the federal government incentivized adoption to promote the uptake of EMR, it is taking a different approach to achieving compliance with standards for use: penalties. According to the HITECH Act, healthcare organizations and practitioners must progress steadily through four stages of Meaningful Use; if they do not, they are docked 1% (in 2015), 2% (in 2016), or 3% (in 2017) of reimbursements for services rendered to patients paying via Medicare or Medicaid (HealthIT.gov, 2015). If 75% or more of all participants in the program do not successfully attest to meeting Meaningful Use standards by 2017, the penalty will continue to increase. In other words, if workers do not comply with standards for technology use, the federal government will withhold an increasingly large portion of pay each year.

The penalty system renders localized forms of resistance that existing accounts of IT implementations documented unlikely to lead to the removal of the technology or the mandates surrounding it. In other words, healthcare workers cannot misuse or disuse the IT because either (a) they will be directly, financially penalized (as in the case of doctors who own their own practices or (b) their organizations will terminate their employment for non-compliance due to the need for the organization to comply with federal policy. As I explore later in this study, healthcare workers instead engaged in other actions that may constitute a novel form of resistance that challenges existing theory.
DATA COLLECTION

Assessing the sources and outcomes of resistance to policy-driven digital infrastructure implementations requires accounting for the various organizations, technologies, and workers involved in the implementation and relating these component parts to one another (Pinch, Ashmore, and Mulkay, 1992). To begin this effort, it is useful to identify relevant stakeholder groups and the interactions among them (Bijker and Law, 1992). The EMR program in the U.S. involves a number of stakeholder groups, each of which is likely experiencing the implementation differently. Likewise, each group has its own role in the system, its own goals and values, and its own ideas about how healthcare should be delivered; these differences provided a starting point for assessing the sources of resistance. I gauged these sentiments and perceptions by conducting semi-structured interviews and/or ethnographic observations of actors in each of the stakeholder groups depicted in Figure 2.
In addition to assessing how individual actors in each group perceive and participate in the EMR program, I also evaluated the interactions between stakeholder groups. These interactions deserve attention because the development of a new technology necessarily involves disagreement and negotiation among groups (Akrich et al., 2002), and the trajectory (Law and Callon, 1986) or momentum (Hughes, 1986) of a given project or program depends in part on how these interactions unfold. The interactions between stakeholder groups in the EMR program are depicted by the arrows in Figure 2. The size of the arrows in Figure 2 varies according to the level of influence each stakeholder group has in the system. For example, the one-way arrow from the

Figure 2: Stakeholders in the Federal EMR Program
Federal Government to Healthcare Organizations is the largest of the arrows because government agencies set policies about EMR with which organizations can only comply. Each of the interactions depicted in the figure leads to artifacts—official documents and public correspondence, for example—that provided important sources of data for this study.

**Semi-structured Interviews and Ethnographic Observations**

The primary method I employed to answer my research questions was the semi-structured interview. I followed guidelines set by qualitative research experts, who detail methods for interviewing that capture diverse perspectives on a phenomenon (Spradley, 1979; Weiss, 1995). By capturing diverse perspectives, a researcher can construct an interpretation that gives equal weight to each stakeholder and his or her group. Furthermore, semi-structured interviewing involves the use of a guiding protocol (i.e., a general set of questions that the researcher can adapt to the ongoing conversation) for the interview rather than a strict protocol or no protocol at all. The semi-structured interview allows the researcher to explore emergent ideas that may provide new insights into the phenomenon of interest, whereas a strict protocol might preclude the interviewee from expressing what is important to his or her thinking on a given topic.

A semi-structured interview protocol also contains common questions so that responses can be compared across informants (Bernard, 1988). In this sense, the semi-structured interview aids the researcher in making comparisons and drawing contrasts across individuals within a group and, if desired, across the groups (Miles and Huberman,
In this act of comparing and contrasting, the researcher can ensure that the sentiments and experiences of the informants are not idiosyncratic, but are in some way thematic and/or related to one another. This method is ideal for achieving a balance between generalizations (i.e., broad statements about the phenomenon of interest, such as “EMR use is annoying”) and detailed reasons behind the generalization (i.e., specific stories and experiences, such as “EMR use includes clicking 800 times a day”).

In the sections below, I provide some examples of questions that I included in the semi-structured interview protocol for each stakeholder group. In designing these questions, I adhered to the strategies outlined by Spradley (1979). These strategies suggest structuring questions in a way that elicits responses related to specific tasks that are central to the phenomenon of interest. Spradley (1979) also noted that questions are more effective when they are designed with knowledge from ethnographic observation than when designed from an external perspective. Following this view, I infused my questions with references to what I saw in the field, such as common functionalities of the EMR and ongoing discourses about Meaningful Use Standards.

The length and number of interviews varied based on stakeholder group. For instance, because caregivers are among the busiest professionals in the world, I broke my protocol into 15-to-30 minute modules and conducted the interviews over the course of several field visits. In total, I interviewed each caregiver for a total of 45 to 90 minutes. I interviewed each government official in a single sitting for 45 to 90 minutes. I recorded the interviews with the consent of informants and made notes about words, acronyms, or
other pieces of language that I was not familiar with so that I could ask follow-up questions and/or do additional research after the interview was over.

I transcribed the interviews myself, rather than sending them to a third party, in sets of five (i.e., I transcribed the audio after I had conducted five interviews within a stakeholder group). I transcribed them in sets to avoid unintentionally adjusting the probing questions I asked based on a single interview. If concepts or ideas were common within the set of five, I inquired about them in future interviews. Transcribing the interviews myself allowed me to make notes about fine details such as the inflection of the informant’s voice or interruptions experienced during the interview. In this sense, this transcription process gave me a deeper understanding of the data than outsourcing the work would have done and constituted my first close reading of the data.

For some stakeholder groups, interviews alone did not provide the depth of knowledge necessary for understanding how and why they held particular views. Previous qualitative research on technology and work showed that people are not always capable of accurately describing their day-to-day work (Collins, 1974; Orr, 1996). Furthermore, informants’ retrospective accounts of specific events often misrepresent what actually happened (Bernard et al., 1984; Huber and Power, 1985). In the case of EMR implementation, caregivers also spoke more or less passionately about EMR use based on how important they saw it in the care delivery process or due to peer influence, among other factors. For this reason, I employed another method of data collection—ethnographic observation—that provided useful details about how caregivers and
administrators used EMR. Ethnographic observation involves following an individual closely and recording all aspects of his or her day-to-day activities. In organizational ethnography, the activities of interest include every action the individual takes while at work (Leonardi and Bailey, 2008), from scribbling a note on scratch paper to entering a diagnosis into the EMR. By observing the day-to-day work of caregivers and administrators, I hoped to understand what motivated them to use EMR, what kept them from fully engaging with the technology, and how EMR use fit (or did not fit) into the workflow.

Whereas interviewing lends insight into how individuals and groups make sense of their work, observation helps to understand how these meanings influence actual practices and vice versa (Emerson, Fretz, and Shaw, 1995). The researcher is tasked with the challenge of staying out of the way of the workers under study so that his or her presence does not influence practice. To this end, I took notes by hand to minimize the possibility of extra noise or distraction. This tactic, among others, allowed me to remain unobtrusive. I endeavored to allow events and conversations to happen around me without interjecting, which differs from traditional anthropological ethnography (see Agar, 1996) in that I did not participate in the “culture” under study. I conducted 40 observations totaling 184 hours. I followed healthcare workers during their daily routines—treating patients in outpatient settings—and focused on their EMR use. I also attended EMR Steering Committee meetings in which administrators, IT personnel, and healthcare workers discussed issues involving EMR, including technical problems,
administrative plans, and workers’ grievances. I took careful notes during each observation, which I later expanded (typically that evening or within two days) into full narratives of informants’ spoken words, interactions with others, and technology use.

When faced with situations in which writing was inadequate for capturing the action happening around me, I also used audio and/or visual recording devices and included transcriptions of these events in my written fieldnotes. As a result, my fieldnotes included my written documentation of a fieldsite visit as well as any accompanying materials—pictures or documents, for example—that I collected during the visit. I placed as little interpretation as possible into my fieldnotes and instead made the notes highly descriptive, rather than analytical. Emphasizing description ensured that data analysis was not taking place during data collection, with one small caveat: Similar to other researchers that have used an iterative approach to data collection (Leonardi and Bailey, 2008; Sutton and Hargadon, 1996), I read the fieldnotes after each visit to develop an “eye” for what to look for in future visits.

**Interviews with Federal Government Officials**

At the top of Figure 2 sits the federal government, which was responsible for designing the EMR program and monitoring healthcare organizations’ compliance with regulations. This stakeholder group consisted of various agencies, two of which were central to the management of the program: the Centers for Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC). These agencies developed Meaningful Use Standards and EMR
certification requirements. Interviews with actors in this stakeholder group—four from CMS and four from ONC—provided insight into the initial development of the program and the vision driving EMR implementation. Furthermore, the interviews also helped to gauge officials’ perceptions of the program’s successes, failures, and future directions. Specifically, I asked actors questions such as the following:

1. In your opinion, in what ways are the HITECH Act and associated Meaningful Use Standards meeting intended goals?
2. What do you see as the program’s biggest success to date? Biggest failure?
3. What are the most promising aspects of the program?

A central influence on my research design was the assumption that negotiation among stakeholder groups influences technology outcomes regardless of the technology’s potential (Akrich et al., 2002; Latour, 1992; Scott and Wagner, 2003). Interviews with federal officials, then, also helped to draw out how salient and impactful the experiences and opinions of other stakeholder groups are at the federal, program management level. For instance, professional organizations such as the American Medical Association (AMA) issued a series of letters opposing the program in recent years. I asked federal officials about the impact of these letters and other efforts to oppose or support the program. Questions aimed at this end included the following:

1. What types of input did CMS/ONC consider from caregivers when designing the EMR program?
2. How often do you or your peers communicate with the leaders of organizations like AMA? How does this communication take place (electronically, face-to-face, etc.)? Can you tell me about the last time you communicated with them?
3. What was your reaction to the AMA’s request to delay or cancel Stage 3 of Meaningful Use?

As noted at the beginning of this section, I conducted semi-structured interviews, which permit the researcher to adjust the protocol and ask probing or clarifying questions. As I received responses to these questions, I adjusted accordingly, but maintained a focus on the design and current status of the program.

**Interviews with Healthcare Organization Administrators**

Healthcare organizations were charged with the task of implementing the federal government’s EMR program and attesting to compliance with Meaningful Use Standards. Therefore, I dedicated a portion of my data collection to understanding how administrators of these organizations encouraged compliance from caregivers, or the users of EMR. To gain this understanding, I asked about specific mechanisms the organization used to measure its workers’ compliance. Example questions included:

1. How did your organization fare in Stages 1 and 2 of Meaningful Use?
2. What was the most difficult standard to comply with? The easiest?
3. What was the reaction of workers in your organization to the Meaningful Use Standards?
4. What sort of mechanisms (rules, incentives, penalties, etc.) did you use to achieve compliance from your workers? How do you know they complied?

I also asked questions that helped to understand how healthcare organizations are interacting with other stakeholder groups, such as EMR vendors. Responses to these questions aided in explaining how healthcare organizations decided on an EMR vendor, and how ongoing relations with the vendors helped the organization meet Meaningful Use Standards:

1. What contributed to your decision to adopt [your system], as opposed to another vendor’s system?
2. What does your organization’s relationship with the EMR vendor entail?

**Interviews with EMR Vendors**

The success of the EMR program hinged upon the availability of EMR that satisfy the requirements of the federal mandate. EMR vendors were in charge of developing these technologies, contracting with healthcare organizations, and initially training users. My questions for EMR vendors from a company pseudonymously referred to as FileMD, then, focused on two relationships: One with the federal government and one with healthcare organizations.

The federal government (particularly CMS) was responsible for certifying and, if necessary, de-certifying EMR. The criteria for certification were publicly available; less
understood was how EMR vendors adapted to the uncertainty surrounding the future of the program. I asked the following to try to elicit an understanding of this dynamic:

1. What is [your company] doing to manage the uncertainty of Meaningful Use’s future?
2. What types of input do EMR vendors have to the federal government regarding Meaningful Use requirements or changes to the requirements?

Once certified, EMR vendors had to also contract with healthcare organizations and train caregivers to use the technology. EMR vendors’ perspectives on this process lent insight into the sources of caregiver resistance. To examine this potential, I asked the following questions:

1. What was your role in the implementation of EMR in local organizations?
2. Can you tell me about how caregivers are trained to use EMR?

**Interviews with Leaders of Professional Organizations**

Perhaps the most obvious manifestation of caregiver resistance to EMR was the actions of professional organizations, such as the AMA. These groups lodged complaints against Stage 3 of Meaningful Use Standards in very public ways. For instance, the AMA and 41 other professional organizations sent a series of open letters to the secretary of the Department of Health and Human Services urging the department to delay or cancel Stage 3 (AMA, 2015a). Additionally, the AMA launched an effort known as Break the Red Tape (www.breaktheredtape.org), now known as The Physicians’ Grassroots
Network (https://physiciansgrassrootsnetwork.org), that provided the organization’s rationale for why the federal government should cancel Stage 3 and relax other requirements of the EMR program. The movement’s websites were complete with portals for signing the AMA’s petition and for writing an email to the federal government suggesting that Stage 3 be cancelled. These professional organizations stood as one of the only channels caregivers had for voicing their concerns to the federal government, as indicated in the information flows illustrated in Figure 2. For this reason, analysis of the organizations’ communications and interviews with their managers were vital to this study. I interviewed ten representatives from two of these organizations—eight from the national American Medical Association and two from a Southwestern state medical association—and asked how they are coordinating the movement against EMR, if at all. I asked questions such as the following:

1. What motivated AMA (or other organization) to mobilize its members against Stage 3 or the EMR program more generally?
2. In your opinion, what will be the keys to successfully opposing Stage 3 or the EMR program? What are the outcomes that you see as favorable?
3. Have you had direct communication with DHHS, CMS, ONC, or any other federal agencies in charge of the program? What have those interactions been like?
4. The AMA is clear about its intention to cancel the policy, but also to continue using the EMR technology. What are the alternatives to the program to maximize the benefits of EMR?
Responses to these questions helped to assess the alignment between the views of individual caregivers and the professional organizations. In this sense, including professional organizations helped to generalize beyond the views of workers in the individual organizations included in this study.

**Interviews and Observations with Caregivers**

At the core of resistance to the federal EMR program were the caregivers in charge of using the technology. I negotiated access to one healthcare organization, pseudonymously referred to here as Southwestern Clinic (SWC), a large, multi-specialty care organization with dozens of facilities in a southwestern city. I conducted interviews and observations at four of SWC’s facilities in four corners of the southwestern city. Specifically, I interviewed physicians, nurses, nurse practitioners, and physician assistants across two specialties: internal medicine and cardiology. My goal in studying two specialties was not to make comparisons between them, but to ensure that my findings were not relegated to one type of practice. In other words, I wanted to be able to say with relative certainty that the sources of resistance I uncovered are generalizable to all caregivers, not just those who are doing a particular kind of work.

Early studies of EMR implementation in the medical informatics literature documented a variety of forms that EMR use can take. In some cases, caregivers were misusing the technology by entering inaccurate data (e.g., Gupta, Raja, and Khorsani, 2014); in other cases, negative sentiments about the technology were less pronounced in practice and only identifiable when researchers asked caregivers’ opinions about the
technology (e.g., Ash et al., 2012). Such findings suggested that further study was needed. One way of doing further study was to ask about critical incidents (Flanagan, 1954), in which the interviewer encourages the interviewee to talk about elements of day-to-day work that stick out in the interviewee’s mind (e.g., unusual problems or difficult tasks). I adapted this approach to EMR use, asking questions such as:

1. Can you tell me about a specific time that you had difficulty using the EMR? What did you do?
2. Who do you talk to when you run into challenges with the EMR?
3. Can you tell me about a particular time when the EMR was very helpful?

I balanced questions about negative and positive experiences with the EMR so that my questions might not prompt particular responses. In preliminary data collection, I found that it was difficult to get caregivers to talk about both positive and negative aspects of the technology. In other words, each caregiver seems to be positively or negatively oriented toward EMR use or Meaningful Use Standards, and this orientation manifested itself in responses to all of the questions. There are two interesting exceptions: Nurse practitioners and physicians who held administrative roles (e.g., medical directors). In these two groups, caregivers seemed to be ambivalent toward EMR use. I discuss some of the potential reasons in the findings section. I adjusted the protocol to suit this ambivalence and give informants opportunities to elaborate on their sentiments and practices:
1. In what ways do you think the EMR supports or detracts from your role in the organization? In the healthcare team?

2. Which features of the EMR are most useful to you? Least useful? How does the utility of these features change according to your task?

Table 2 summarizes the number of interviews I conducted by stakeholder group. Because caregivers were the primary EMR users, and because the group included a number of subgroups, I conducted more interviews with this stakeholder group than with any other. I also conducted five interviews with healthcare organization administrators, who in some cases were also caregivers (as in the case of medical directors).
<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Organizations</th>
<th>Actors</th>
<th>Number of Interviews</th>
</tr>
</thead>
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<tr>
<td>Federal Government</td>
<td>Centers for Medicare and Medicaid Services</td>
<td>Agency Officials</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Office of the National Coordinator for Health Information Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare Organizations</td>
<td>Southwestern Clinics</td>
<td>Administrators IT Personnel</td>
<td>10</td>
</tr>
<tr>
<td>EMR Vendors</td>
<td>FileMD</td>
<td>EMR Analysts</td>
<td>5</td>
</tr>
<tr>
<td>Professional Organizations</td>
<td>American Medical Association</td>
<td>Representatives</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Soutwestern state medical association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregivers</td>
<td>Southwestern Clinic</td>
<td>Doctors Nurses Nurse Practitioners Physician Assistants Technicians</td>
<td>42</td>
</tr>
</tbody>
</table>

| Total                   | 75                                                                            |                            |                      |

Table 2: Summary of Interviews by Stakeholder Group

**Primary source data**

Interviews and observations provided insight into how each stakeholder group perceived and experienced EMR implementation in the U.S. healthcare industry. But as depicted in Figure 3, which repeats Figure 2 but with the addition of numbered arrows, there were also important flows of information between each of the stakeholder groups that shaped
these perceptions and experiences. These interactions often generated publicly-available artifacts, such as legislation, open letters, opinion pieces, and websites that served as primary data sources for my inquiry. For other interactions, I relied on access to meetings and documents from my fieldsite organizations (SWC and FileMD).

![Diagram of stakeholders in the Federal EMR Program]

**Figure 3:** Stakeholders in the Federal EMR Program, numbered

**Arrow 1: Interactions between the Federal Government and Healthcare Organizations—Meaningful Use Standards**

The interaction between the federal government and healthcare organizations was largely a one-way interaction. That is, the federal government passed legislation mandating that healthcare organizations adopt, implement, and “meaningfully use” EMR.
Organizations had very little latitude in how to carry out this process: They chose from a list of certified EMR vendors in their area, purchased the system, and often allowed vendors access to workers for training and support. Therefore, my analysis of the government-healthcare organization interaction was based primarily on the HITECH Act, Meaningful Use Standards, and any updates or changes issued by federal agencies. There were various resources available that documented this interaction, including the CMS EHR Incentive Program website, which listed all Meaningful Use Standards and posts any changes the federal government makes to these standards. These posts included the rationale behind the change, which was valuable for understanding how the negotiation process played out at the federal level.

Arrow 2: Interactions between the Federal Government and EMR Vendors: EMR Certification Documents

The federal government’s interactions with EMR vendors were also one-way and resulted in publicly-available information. These interactions took the form of EMR certification documents. Under the federal mandate, any EMR vendor wishing to participate in the program needed to submit testing reports to CMS, which ensured that the technology was adequate for meeting Meaningful Use Standards. The step-by-step process was listed on the CMS website; furthermore, reports were available that list which EMR were certified and those that had been de-certified for failing to update the software to comply with advanced stages of Meaningful Use. These documents allowed
me to analyze how the federal government was maintaining control over the program and enforcing the mandate.

**Arrow 3: Interactions between EMR Vendors and Healthcare Organizations—Steering Committee Meetings**

Interactions between EMR vendors and healthcare organizations—such as adoption decisions, training, and ongoing development of the technology—was not publicly documented. Fortunately, I had access to some of this interaction through my fieldsite. SWC instituted monthly EMR steering committee meetings, in which representatives from the EMR vendor (FileMD) and members of SWC, including IT professionals and administrators, tackled issues of importance related to the EMR. Participants in these meetings discussed problems the organization encountered with the EMR, potential solutions, and plans for complying with Meaningful Use. I attended and recorded four of these meetings to document the negotiation process between healthcare organizations and EMR vendors. Analysis of this documentation pointed to some potential reasons for caregiver resistance because the healthcare organization solicited feedback from caregivers before holding the meetings.

**Arrow 4: Interactions between Healthcare Organizations and Caregivers—Internal Communications and Administrative Documents**

Although caregivers did not participate in steering committee meetings, they did communicate with administrators and voice their opinions and concerns regarding EMR. These interactions took place through internal communications such as emails, meetings, and informal face-to-face interactions. I captured many of these sources in my
observations at the healthcare facilities, but some, such as emails, I did not. Instead, I queried informants about their interactions during my interviews with them, asking for concrete (often recent, for better recall) examples.

The other direction of this interaction—communication from administrators to caregivers—took place via administrative documents that were sent to the entire organization or to individual caregivers. The organization-wide documents provided statistics, often presented as bar charts, about caregivers’ use of EMR. For example, one metric used to assess how well caregivers were using EMR was chart closeout rate. Essentially, every physician was expected to complete the record of a patient’s visit immediately following the visit. To be considered complete, the doctor had to “close out” the chart, rendering the visit information impossible to edit thereafter. Each doctor in a given facility was listed on the x-axis of the bar chart and his or her closeout rate on the y-axis. Similar administrative documents were sent out to show which caregivers were keeping their patients’ blood pressure in check, immunizations up to date, and other aspects of performance, all of which were drawn from the EMR. I asked three interviewees to take me through these documents after our interviews. I recorded and transcribed our interaction to serve as evidence of the interaction between healthcare organizations and caregivers.
Arrow 5: Interactions between Caregivers and Professional Organizations—Newsletters, Opinion Pieces, and Conferences

As mentioned earlier, one of caregivers’ few channels for communicating with the federal government was through professional organizations. Furthermore, caregivers were likely to voice their concerns about EMR among their peers in their professional organizations. For this reason, newsletters and opinion pieces published by professional organizations such as the AMA lent insight into the interaction between caregivers and their professional organizations. To capture this type of data, I read publications from the AMA, a state medical association, three medical specialty (e.g., cardiology) organizations, and two nursing organizations by becoming a guest member and receiving their publications. Furthermore, the AMA’s websites and interviews with AMA representatives helped to assess the interactions between caregivers and professional organizations.

Arrow 6: Interactions between Professional Organizations and the Federal Government—Open Letters and Websites

Professional organizations such as the AMA negotiated the future of the EMR program on behalf of caregivers. These organizations negotiated in a very public way: sending open letters to federal agencies, often with the backing of Congressional members (AMA, 2015a); launching websites and portals for AMA members and the general public to support the movement (Break the Red Tape, 2015); and holding town hall meetings in various regions of the U.S. to discuss how to best resist Stage 3 of Meaningful Use. All of these actions left artifacts, such as written correspondence or
publicly-available audiovisual recordings, that provided valuable data for assessing the
sources and outcomes of resistance to the EMR program.

The purpose of conducting interviews and observations and gathering primary
source data was to engage in a process of what Creswell and Miller (2000: 126) refer to
as data triangulation, or a process in which the researcher searches “for convergence
among multiple and different sources of information to form themes or categories in a
study.” According to Creswell and Miller, searching convergence of themes across data
sources is one way to establish validity in qualitative research. They provide eight other
processes and strategies for establishing validity, three of which I will refer to in the
findings section in order to convey the validity of the themes I found in the data.
Disconfirming evidence refers to the process of providing “negative evidence” to support
claims. Prolonged engagement in the field—defined as spending several months or more
observing the community under study—ensures that themes in the data are present over
time. Thick, rich description, or describing and explaining events in a way that enhances
the reader’s experience of being “transported” to the setting (Creswell and Miller, 2000:
129), aids in conveying authority on the research topic and establishes credibility for
claims. I explicitly refer to these three only, but also engaged in the processes of member
checking (confirming and disconfirming themes with the members of the community
under study) to establish validity.
DATA ANALYSIS

I used primarily qualitative coding techniques to analyze the interview, observation, and primary source data. I employed a method of analysis that reflects some tenets of what is known as “grounded theory,” but differs from its traditional definition (Corbin and Strauss, 1990) in several ways. Nonetheless, my analysis was interpretive and iterative. In other words, I began my analysis with repeated readings of all data sources—interview transcriptions, fieldnotes, and primary source data—and continued with these readings until I could identify all of the actors in each stakeholder group and trace the interactions among them.

As noted earlier, my analysis was not entirely separate from the data collection process. I undoubtedly began to problematize certain aspects of the EMR program, such as caregivers’ resistance and professional organizations’ negotiation on their behalf. This approach aligns with traditional iterative approaches to qualitative research (Emerson, Fretz, and Shaw, 1995), which have been deployed in practice very successfully (see Ancona and Caldwell, 1992; Leonardi and Bailey, 2008; Majchrzak et al., 2000 for examples). An iterative approach involves adjusting data collection processes based on ongoing analysis. Although I tried to avoid layering interpretation onto my fieldnotes, I did write memos and interim case summaries (Emerson, Fretz, and Shaw, 1995; Miles and Huberman, 1994) after my field visits that included some interpretation of what I saw. Based on these interpretations, I somewhat adjusted my data collection to “fill in the
holes” in my analysis (Leonardi and Bailey, 2008: 418) and to hone in on phenomena of interest.

I stopped the simultaneous data collection and analysis of primary documents and other archival materials, and instead focused on pure analysis, once I reached data saturation, or the point at which new data collection only replicates data that has already been collected (Bowen, 2008). Put simply, saturation occurs when the researcher is seeing the same things over and over again. Once I reached saturation, I followed Corbin and Strauss’ (1990) guidelines for coding the data.

Open coding was the first step. In open coding, the researcher is free to place any interpretation onto the data. After repeated reading of transcripts and primary source data, I had some themes or concepts in mind that influenced this round of coding. For instance, I became interested in sentiments and practices. Sentiments were the positive, negative, or neutral feelings that caregivers expressed about EMR, signaled by phrases such as, “I feel,” “I wish,” or “I believe.” Practices were the work activities that centered on EMR use. For instance, I began to notice that EMR use involved physicians undertaking what I later called “digital scut work”—work that involves cleaning up fields and forms inside the EMR and other tasks that are not typically associated with the medical profession. In open coding, I would simply code each instance in which I see this kind of work being done. The initial codes for digital scut work were “data cleaning,” “fixing others’ mistakes,” and “form filling.”
Following Corbin and Strauss (1990), I began redefining codes, conflating codes with other codes, or making codes increasingly granular throughout the open coding process. Once I identified a number of concepts and themes in the open coding stage, I used several other forms of coding to deepen the analysis. For instance, selective coding involved partially avoiding laying new interpretations onto the data and instead looking closely for instances of a particular concept or theme. Axial coding involved relating codes to one another by breaking single codes down into multiple, related codes or recognizing co-occurrence of two or more themes and conflating them (Corbin and Strauss, 1990).

Central to the coding process was Glaser’s (1965) idea of constant comparison. This idea refers to the process of comparing new instances of a code to its previous uses to ensure that there is thematic consistency (Glaser, 1965). Through constant comparison, the researcher can construct a codebook that defines each code (i.e., what it refers to) and when it should be applied (i.e., key phrases or references that suggest it is thematically consistent with previous uses of the code). When working through multiple stages of coding, I created a coding protocol that defined how I should apply each code.

I applied the above process to observation notes, interviews, and some of the primary source data. Coding the primary source data—in particular, the Break the Red Tape and Physicians Grassroots Network websites—presented a challenge in that traditional qualitative coding techniques typically refer to analysis of interview and

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2 The Physicians Grassroots Network website replaced the Break the Red Tape website, an issue I discuss further in Chapter 5.
observation data. I developed a system by which I compared the rhetoric of the two websites. In my coding, I noted the following:

1. Issues raised (examples: EMR, telemedicine)
2. Tone (examples: defensive, offensive)
3. Imagery (examples: colors, infographics)

Comparing the websites in this way allowed me to assess how the AMA and its signatories—specialty organizations, nursing organizations, and physician assistants organizations—adjusted the message of their movement as the movement progressed.

My analysis revealed that administrators at SWC had little choice when it came to EMR adoption, implementation, and use decisions. However, administrators were able to deploy features of the EMR to accomplish organizational goals and gain the compliance of workers with federal policies for EMR use. Frustrated with both the policies and the practices that characterized EMR implementation, caregivers had no opportunities to resist locally by traditional means (e.g., by misusing the technology); instead, they turned to their professional organizations to engage in a political movement against the EMR program. In the following chapter, I lay out how localized frustration culminated in national resistance to the EMR program and build a model to illustrate the process. In the discussion (Chapter 6), I pull together threads from Chapters 2 and 5 to relate the model to existing research on digital infrastructure development and resistance to new IT implementations.
Chapter 4: Findings Part 1: Mandated IT Implementation for Digital Infrastructure Development in the U.S. Healthcare Industry

The U.S. federal government’s program to construct a digital infrastructure for healthcare data mandated that healthcare organizations adopt certified EMR technologies, that managers obtain workers’ compliance with Meaningful Use standards, and that workers develop new practices for recording data about their patients. In this chapter, I present the findings of a study of one instantiation of EMR implementation at SWC. The central argument of the chapter is that each of the components of the program diminished the choices available to organizations, managers, and workers relative to the options these actors typically have about which IT to adopt, how to implement it, and how to use it.

Specifically, organizations had little flexibility in their EMR adoption decisions because all EMR technologies needed to meet federal certification criteria. Managers, faced with a fixed technology and a specific set of practices to enforce, could do little to customize or ease the burden of EMR on doctors and nurses. Instead, they developed new strategies to gain workers’ compliance to hospital administrative policies beyond federally-mandated use of EMR by making use of panoptical features of the EMR to evaluate and compare caregivers’ performance. The caregivers charged with using the technology soon recognized its deleterious effects on their day-to-day lives, including the impact of managers’ use of EMR outputs for administrative purposes and their own time cost in using EMR. However, caregivers could do little to resist the change locally—i.e., within and against their own organization—without risking losing their jobs. Some
caregivers resigned from their positions, but others instead accommodated the technology at work by taking on longer hours, learning new skills, and otherwise complying with federal guidelines for EMR use.

Observations, interviews, and document collection at SWC facilitated analysis of these first three phenomena: limited organizational choice in the adoption phase, the development of managerial administrative-use practices in the implementation and use phases, and diminished worker ability to resist within and against their organization. As I describe below, this scenario appeared immutable for all actors because of the specificity and authority of the federal mandate. In other words, in contrast to traditional implementations depicted in Figure 4 (repeated below from Chapter 2), the federal mandate left few opportunities for replacing the new IT or customizing the IT and IT policy to suit local realities based on feedback from workers. Whereas traditional explanations of IT implementations include phases for organizational choice of IT and managerial responses to workers’ concerns or resistance behaviors (e.g., IT customization or replacement), no such phases existed under the federal EMR mandate. Any actions workers took to demonstrate their frustration with the new IT could not influence managerial or organizational decisions about how to proceed with EMR; those decisions were left to federal regulators.
Recognizing the inability to influence an organizational response, caregivers turned to their professional organizations to resist the change at the national policy level, an effort that I document and explain in Chapter 5. In particular, doctors leveraged their political and social influence to launch a series of movements against the federal EMR program, which included activities ranging from town hall meetings to directly lobbying U.S. Congress. These activities occurred beyond the boundaries of a single organization or small set of organizations and influenced federal policy rather than organizational IT policy, an occurrence that challenges our existing view of resistance to new IT implementations. In particular, it suggests that when local avenues for resisting change are stymied, workers with sufficient political and social influence can take alternative routes to resist.
LIMITED ORGANIZATIONAL CHOICE: SWC IMPLEMENTS FEDERALLY-CERTIFIED EMR

SWC’s administrators and other medical organization managers in the U.S., had no choice but to implement EMR technology in accordance with the Federal Government’s mandate. The clinic was particularly beholden to compliance with federal policies because its various locations served a large population of elderly and poor patients who were disproportionately insured by Medicare or Medicaid as compared to private plans. One administrator explained that 95% or more of all patients who came through the clinic’s doors were likely insured by Medicare or Medicaid. Under the Federal Government’s EMR program, SWC would have seen a 1% decrease in reimbursements for these patients in the first year it failed to implement federally-certified EMR or if the healthcare organization’s doctors, nurses, or other caregivers had failed to use the technology in accordance with Meaningful Use standards. Year after year, the deduction would have increased by an additional percentage point. For SWC, even a reduction of a few percentage points in reimbursements for Medicare and Medicaid patients would have cost the organization “tens of millions” of dollars, according to the Medical Director. Unsurprisingly, then, SWC implemented EMR to comply with the federal mandate and avoid sizeable financial penalties in the immediate and long-term future.

Federal penalties were perhaps necessary for rapid and centralized creation and growth of the healthcare digital infrastructure. Indeed, the specter of penalties sparked a fast implementation process at SWC. SWC fully complied with federal government
requirements for EMR implementation and use, a decision that was, according to SWC’s Medical Director, entirely pragmatic. The organization sought a quick, simple, reliable, and non-disruptive way to comply with federal policy. The director explained that the first step in what would end up being a three-year transition process was fairly straightforward: selecting an EMR that would enable the organization and its workers to comply with federal guidelines while only minimally altering workflows. The vendor selection process was a rare opportunity for SWC to demonstrate some choice over EMR and its role in their organization. Asked about the selection process, SWC’s Medical Director explained that the team selected an EMR with one of the largest market shares in the U.S., FileMD, based on two factors: ease of communicating with other clinics and long-term viability in regard to federal certification. Ease of communicating with other clinics was appealing to SWC because the organization often coordinated patient care with other facilities, which made being able to send and receive medical records easily a top priority:

*The patients we see don’t always make their own calls or fill in whoever else they see about what they’ve had done, who they’ve seen, that sort of thing. It’s important for us to know, you know, and so we take on some of that coordination ourselves already, especially for our older patients. And so a part of it was getting a system that would make that easier.*

SWC administrators also discussed seeking an EMR that would enable communication with one another in addition to allowing SWC caregivers to access medical records about patient visits with non-SWC caregivers. Both inter- and intra-organizational
communicative capabilities were core requirements for federal EMR certification. The issue of federal certification, the director explained, was a top priority:

*We wanted something tried and true, but more importantly, that we know would remain certified even after, say, a few years. A big problem is that sometimes they become de-certified, if the technology isn’t updated to meet the new stage of Meaningful Use. So we went with something we were sure would be robust.*

The decisions administrators described involved drastically reduced choice relative to traditional IT decisions in organizations. For example, when asked whether or not the organization conducted user testing, workflow analysis, or any other pre-implementation evaluation commonly found when organizations adopt and implement a new IT, all administrators replied that SWC had done no testing of its own. Instead, they remarked that the federal certification process required vendors to do these sorts of activities prior to obtaining certification. Representatives of the vendor, FileMD, explained that the implementation “go-live” phase served as a testing period of sorts: The vendor trained analysts to gather complaints about and problems with the EMR and submit them to the EMR Steering Committee. However, the analysts noted that the issues identified during EMR deployment often could not be remedied without violating federal policy for EMR design and use.

Rather than making IT decisions based on the characteristics of the organization, its technology, and how it planned to help implement and support EMR use, administrators instead chose an EMR almost exclusively based on their expectation that the technology would remain in compliance with federal certification standards for the
next decade (or, as one administrator put it, “as long as Meaningful Use reigned”). In this context of mandated digital infrastructure creation in healthcare, then, Phase 1 of the implementation—typically the organizational adoption decision—becomes simply “organizational vendor selection” and stems directly from a policy mandate.

The diminished organizational choice about which EMR to adopt did not seem to concern SWC administrators. This contentedness with the limited choice of vendors emerged perhaps in part because no administrators at SWC expected EMR to radically transform or improve any part of practice, whether managerial practice or clinical practice. In fact, administrators repeatedly mentioned that they believed many of the uses the federal government envisioned for EMR—such as IBM Watson-like clinical decision support tools—were perhaps unlikely to come to fruition; instead, administrators explained that they would be satisfied if workers were simply able to quickly exchange patient records without the need to call, fax, or visit other healthcare facilities. As one administrator noted:

*A lot of the early talk was, among the docs, topics like automated decisions, topics like robot doctors [laughs], things that seem silly now because we’re struggling with the basics here. We still have people faxing records or receiving faxed records, so the concerns were there, but those went away pretty quickly.*

Yet, the process of implementing EMR proved difficult even though administrators did not seek to transform or improve practice via EMR implementation. The administrators explained that the installation process took about a year to reach all workers required to use EMR. Departments of the clinic that had the least prior use of
and experience with EMR (the ones that previously used EMR in only limited capacities) quickly began using FileMD (and were the first to receive it). In these departments, including internal medicine, doctors had no existing standardized EMR systems to complicate the change process; all EMR use prior to that point was optional, and for many doctors, the switch to federally-certified EMR was the first foray into digitized medical records. Accordingly, some internal medicine caregivers welcomed the opportunity to modernize. As one nurse practitioner noted,

*It’s in keeping with the rest of our lives. We do everything else digitally, so when it came time to put a computer in the room, I was ready for it. It took some learning, it still does take some learning, but it’s in keeping with the rest of our lives.*

Other departments—such as cardiology—had existing, specialty-specific EMR systems installed in partner facilities where they performed surgeries and other procedures. Their familiarity and comfort with these systems rendered them less willing to, and hence slower to, switch to FileMD than those departments without such systems. Indeed, cardiologists demonstrated the first sign of resistance to EMR in voicing their reluctance to switch to the new system. The cardiology director at SWC recounted this reluctance and noted doctors’ parallel use of new and old systems as doctors attempted to keep their old systems in place by recording notes for the same patients in both systems:

*So in one way, it wasn’t new at all because hospitals all had, a lot of the hospitals had different systems as it was, and so it was pretty common to have notes in different systems depending on where you work. But when the mandate, when we switched over to FileMD, it was the first time [laughs], it was the first time I saw two in one place, you know? Like doubling-up on the notes.*
The cardiology director further noted that while at first some doctors intended to keep the two technologies running in parallel, their efforts soon proved to be unsustainable; doctors’ own desire for efficiency in interacting with other hospitals soon rendered their initial resistance mute. The reasons were twofold. First, cardiologists expressed concern about the additional time required to manage use of two EMR systems. They reported that although it added just 10 or 15 minutes for each patient they saw, the time quickly added up. Second, and perhaps more consequential, the local heart hospital where many SWC cardiologists conducted procedures was also switching to FileMD to comply with federal regulations. As the cardiology director explained,

*It made more sense for them [the doctors] to get on with it [FileMD use] once the heart hospital switched, because they were already tired of having to bounce back and forth between all the different systems. I think, looking at that, they thought it [the switch to FileMD] might not be as bad as they thought. At least now, you know, before they had to know whichever one the different hospitals have, or they have to hire someone that knows it, and having just one to learn and to know was I think a good thing.*

Here, the cardiology director acknowledged the benefits of standardizing EMR. Specifically, he noted that the perceived benefits of switching to FileMD came to match or outweigh the perceived costs of managing two systems or resisting the change in other ways.

Much of the resistance doctors, in particular, voiced and demonstrated towards FileMD was of the sort we expect to see when any worker begins learning a new technology. The training portion of implementation involved some interaction between
the healthcare organization and the EMR vendor and aimed to overcome the commonplace types of resistance that both SWC and the vendor anticipated prior to the implementation. As one vendor analyst responded when asked about what she expected when training new users, “It has never gone smoothly, not once.” Likewise, one SWC IT staff member acknowledged that he expected caregivers to encounter some difficulty during the transition process. “Especially the doctors,” he said. “It’s meant to help them, and I think it will, but we have our work cut out.”

FileMD sent staff, including trainers and implementation analysts, to assist workers during the first month of the “go-live” period at SWC to help overcome the anticipated challenges. SWC administrators spoke of this period as one of doubt among both administrators and caregivers. A member of the IT staff at SWC recalled one incident that stuck out to him during the initial training period. The incident took place in a room outside of the patient visitation rooms, an area with a line of computers referred to by workers as “the hallway” because it is so narrow:

*One of the first days, here we had these trainers sitting at almost every computer in the hallway. Now, the hallway is already small, already a lot going on. And here we have these kids, right out of college, this is probably the poor thing’s first job, and now he’s trying to teach docs about something, and he’s trying to do it as the doc wants to be doing something else, doing his job. Well, we’re getting towards the end of the day, and one of the docs, he starts yelling at one of these kids because he can’t access a chart. He can’t access a chart, he can’t go see the patient. And to him, it’s the kid’s fault. And to the kid, it’s our fault for not having longer trainings before going live. And to us, or at least to me, I’m white in the face because I know when that kid leaves, it’s me who’s getting yelled at, and my daily life.*

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To be sure, IT staff and caregivers appreciated the support of vendor trainers and analysts in the rollout period. However, what concerned the IT staff member above and some caregivers was the reality of adding new practices to labor-intensive work and, furthermore, practices that were not considered part of the job description.

The concerns discussed above are, like the initial forms of resistance from cardiologists, not uncommon to new IT implementations. Workers often express hesitation to incorporate practices that are not considered central to their work and demonstrate their hesitation in the training period. But a key difference in the EMR implementation at SWC, and perhaps in the implementation of federally-certified digital infrastructure technologies more generally, is that EMR design, training, and implementation was carried out by software vendors. Vendors often do provide training and support for various types of software (e.g., Nelson and Cheney 1987; Sabherwal 2003). But in this case, organizations submit somewhat more to vendor control than they do in non-mandated scenarios because they cannot themselves customize or adapt the IT, as it must remain federally-certified.

The mandated nature of the EMR implementation at SWC also engendered some unintended consequences beyond those that typically arise in response to other, more traditional technology implementations in organizations. Specifically, SWC administrators used built-in functions of the new technology to support new compliance strategies, such as checking that doctors were following SWC policy in handling digital paperwork. Managers rationalized these practices as necessary mechanisms by which
they could ensure that the organization and its workers would be able to attest to the Meaningful Use guidelines set forth by the federal government. Under this guise of policy compliance, managers were also able to use these new administrative practices to gain compliance with internal policies that doctors had previously ignored—in particular, policies about technology use. I turn to these compliance-gaining practices below, emphasizing managers’ uses of panoptical features of the EMR. As a result of managers’ decisions to use EMR in this way, doctors found themselves in a double bind with no avenue for localized resistance. In the immediate sense, they were charged with doing new, time-intensive digital tasks such as form filling, correcting others’ errors and errors of their own, and acknowledging automatically-generated alerts and reminders. Doctors then found themselves being evaluated with analyses of the data they spent extra time preparing. Managers now had transparency into whether or not doctors followed organizational policy and would use this transparency to develop new compliance strategies. Analysis of interviews with these caregivers revealed that frustration and resignation overwhelmingly characterized their sentiments toward the technology vis-à-vis the federal government’s plans for the creation and growth of an EMR infrastructure.

**TRANSLATING FEDERAL REGULATIONS: ADMINISTRATORS OPT FOR PANOPTICON TO GAIN COMPLIANCE**

SWC did not intend, from the outset, to alter doctors’ workflow, to gain transparency into doctors’ work practices, or to enforce organizational policy when implementing and using EMR. Rather, SWC administrators had no choice but to adopt EMR technology and comply with standards for its use. But they soon found that they
could employ FileMD functions to analyze the data that doctors entered (e.g., patient vital signs) and data that the system logged automatically (e.g., number of patients seen). Using the output—aggregate measures of number of patients seen, time spent with patients, patient well-being indicators, and the like—administrators tracked and evaluated the performance of individual doctors. In this manner, administrators found that the EMR technology provided them with the kind of digital panopticon that Zuboff (1988) reported in an early examination of managerial uses of computerized systems. SWC administrators made extensive use of such features to meet administrative goals. I documented and analyzed the strategies administrators engaged in to answer RQ1, which asked what strategies managers use to manage workers’ IT use in the absence of the ability to make IT adoption, implementation, and use decisions.

A good example of how administrators managed IT use by employing the panoptical capabilities of the EMR arose in the context of performance charts. EMR use at SWC enabled administrators to keep close tabs on the performance of its staff by reporting the rate at which doctors “closed out” patient charts and performed other duties. To “close out” a chart was to lock it to further editing for a given visit. Doctors could close out patient charts only after all notes for a given visit were complete; once the chart was closed, doctors could not edit the notes at any point in the future. For example, on a busy Tuesday morning, I observed an internal medicine doctor saving time during patient visits by entering some notes about the visit as she saw the patient, leaving the chart “open” so as to not lock it to further editing. At the end of the day, she came back to the
files to expand the notes and enter any missing data in appropriate fields before “closing it out,” which the EMR’s screen confirmed with a pop-up box stating “[PATIENT NAME]’s chart was closed at [DATE/TIME] by [CAREGIVER NAME].” As she explained, this saved time because she did not have to switch her attention between the patient and completing the medical chart; rather, she could work through the notes all at once. Federal policy dictated that the chart did have to be completed at some point in the day, though, because a closed chart served as testament that all the patient data in it were accurate and reliable, and therefore reportable and ready for analysis. SWC administrators, then, did what they could to ensure that doctors closed out charts.

Because FileMD kept track of all chart closings in the course of patient treatment, and because doctors had to sign into the system to close out a chart, the EMR technology not only reinforced behaviors that ensured compliance with the federal regulations; it also contained data that could tell administrators how many doctors, and which doctors, were or were not closing out charts per SWC guidelines. SWC administrators went beyond the requirements of federal policy and used this information to develop new ways to hold doctors accountable for their work. As I will explore later, administrative uses of EMR may have pushed doctors and other caregivers towards taking action outside of their own organizations.

One specific application of EMR to administrative goals relates to administrators’ use of the EMR technology to generate performance reports that quantitatively compared various aspects of caregivers’ work to other caregivers within the same organization and,
in many cases, to other healthcare facilities within the same healthcare system. Performance reports included bar graphs with doctors’ names along the x-axis and their performance—percentage of charts closed, in this case—on the y-axis. Other evaluations displayed doctors’ individual performance on patient blood pressure control, cholesterol management, and other population health targets. This capability was new with the EMR implementation; prior to it, collection of such data would have been too time-consuming. SWC administrators emailed these performance reports to the entire medical staff each week to encourage better performance. One administrator noted the reasoning behind this policy and its enactment:

We thought that being able to see your own progress and pit it up against what other doctors are doing, it might drive us toward some of our goals. It’s not meant so much as competition as it is making progress.

Through this act, they made public each doctor’s performance, allowed easy comparison of performance across doctors, and implicitly established metrics such as “percentage of charts closed” as important for the organization. On three occasions, I observed doctors opening the email containing performance reports before the first patients arrived, between 8:00 and 8:30 AM. The email, sent from an SWC administration email address to all medical staff, included an attached document with a short review of the month’s successes and shortcomings and over ten pages of performance reports replete with charts that plotted doctors’ individual performance. On each occasion, the doctor read the short review on the first page of the document, skimmed through the performance reports that followed looking for his or her own name
on each page, and closed the document. On one occasion, I noted a cardiologist scoffing when reaching his own name on the performance report page indicating chart closeout rate. “Useless,” he muttered under his breath. In interviews, several doctors expressed similar sentiments and outlined their concerns over being evaluated on the metrics enabled by these new performance reports.

Doctors demonstrated mixed responses to publicized performance reports and other managerial strategies for gaining compliance with the federal mandate. Some had stronger reactions to the reports, viewing them as attempts to shame doctors and to cast some doctors as lazy rather than simply busy. One internal medicine doctor was visibly and audibly upset as he noted that the performance reports, which he termed “shit lists,” constituted a form of unprecedented “shaming” in the organization:

Doctor: There’s so much stuff to do [under the EMR requirements], so much of it’s a waste of time, that we can’t get our actual notes done. That means you can’t close out the chart. You can’t close out the charts, then you get on the shit list. Then there’s a list that goes out that everybody gets to see: “Who is the lazy person?” Or maybe they’re the ones who are busy. Maybe they’re seeing a lot of patients, not lazy. Or the ones that are not willing to go home and spend... One of [our] docs now takes a day off, and what he does with a good part of that time is catch up on his [digital paperwork], so he’s working four days a week. Four days where he’s being paid; one day where he’s not being paid. That means his patients can’t see him on Fridays.

Interviewer: Can you elaborate on this “shit list”?

Doctor: Well, the clinic puts out, somebody puts out a list of people that haven’t closed their charts out after a certain period of time. And how many open charts they still have after three days or 72 hours or something like that. So there’s sort of a shame element to it. I would... you know, I’m pretty compulsive about that stuff. So
the clinic, it’s an email, to all doctors, “Here are the doctors that haven’t closed out.”... I graduated from medical school in ‘71, and I finished my internship and I didn’t want to get drafted, there was still a draft, so I joined the National Health Service Corps... they sent doctors to underserved areas. To Appalachia, where I went, inner cities... And so I went to Appalachia. And I was the only doctor, uh, I was out of my internship, I mean, you know, truly didn’t know shit. And I was the only doctor in an entire third of the county... And I was an honored figure. I mean, I came in, my wife and I were the only people to ever show up there, we’re from the Northeast so we’re fast-talking doctors... you couldn’t be more alien... But I was a revered figure in that town because I was the town doctor... And the notion of being shamed by not closing out my charts is inconceivable... it wasn’t so much that I had to be revered, but that there was a certain recognition, that I had worked hard to develop skills, and that my job was to help sick people. It was a noble thing to do. Um, that’s a societal change that, and now we do it to ourselves. We’ve first of all lost the role, the term “doctor” went away, became “provider,” now we’re a provider... So now we try to shame ourselves into closing out charts. Putting out a list of the bad guys.

The contrast between physicians as a “revered” group of professionals and the experiences they were beginning to have with “shaming” in their own organizations later manifested itself in national-level discussions of the EMR program. Doctors throughout the U.S. expressed concerns to the AMA about such shaming tactics, as evidenced in AMA publications. Relatedly, doctors also viewed the bias toward administrative functions as a danger to patient safety. They frequently expressed this sentiment in response to questions about the impact of functions such as rating performance based on patient outcomes. An internal medicine doctor provided an example in the context of hypertension control:

We have a list of hypertension control. Who’s got the patient at, you know, 140 over 90 or less, which, by the way, in a geriatric
practice or something is not the guideline. It’s one guideline. It should be looked at carefully. I remember many years ago I got a patient sinkable, blackout, based on too much anti-hypertensive [medicine]. And they broke their femur. Or humerus. They broke their humerus. Doesn’t matter, they hit the deck. You learn a lesson when that happens. Because I was, “get him down to 140 over 90,” well when they stand up they drop down to 110... So one learns that there’s, not everyone’s the same, and that you, I know the guidelines, I, I got it, I got it, I got it. But I’m going to use my judgment... And if you have an older population, the hardest people to take care of generally speaking, you’re going to have more and more of them that don’t meet the guideline. Because the guideline is wrong. I was... the list came out, for the entire department, I was the worst on the list. I said, “It’s a good thing I’m leaving my regular practice, because if you ever do that again, I’m going to, I will leave. But since I’m leaving, it’s no longer germane to me. I will not be put on the list of who’s the worst. You go look at every chart of a patient, and you tell me what’s wrong with it.” [internal medicine doctor]

Shaming and safety concerns were related in that they took aim at EMR’s erosion of what it means to be a doctor or a caregiver. Doctors, in particular, traditionally held a high social position, owing at least in part to their commitment to healing and keeping patients safe. Several doctors at SWC construed the EMR program as an affront to the traditional costs and benefits of being a member of the medical community.

The panoptical administrative uses of EMR at SWC demonstrated how, under a federal policy mandate, traditional post-implementation organizational responses—such as customization or replacement of the technology—are rendered obsolete. Instead, traditional responses are replaced by compliance-gaining strategies that sometimes exacerbate workers’ frustrations (see Figure 5). By making use of log data automatically recorded by the EMR and the patient data caregivers entered into the EMR, SWC
administrators developed strategies to socially (and, in some cases, personally) penalize workers who did not strictly adhere to both Meaningful Use standards and internal administrative policies for patient care. Managers, in comparison to organizational decision-makers and workers, enjoyed the most degree of choice under the federally-mandated implementation in that they could leverage the fixed technology and immutable federal policies to accomplish managerial goals. Furthermore, rather than having to solicit and be sensitive to workers’ feedback about EMR use to inform customization or replacement decisions, SWC’s administrators could be reasonably sure that the EMR system would persist no matter the uses they made of it, so long as those uses maintained compliance with federal policies. As demonstrated in the quotes above, this aspect of the implementation frustrated caregivers perhaps more than the federal policies and certified technologies themselves.

Figure 5: Managerial Compliance-gaining Strategies in Mandated EMR Implementation
FRUSTRATION WITH NO OUTLET: LOCALIZED RESISTANCE STYMIED AT SWC

Despite their frustration, workers at SWC largely complied with federal and organizational expectations for EMR use. For example, all of the doctors I observed recorded notes in the EMR per federal standards, although they varied in where and when they did so. Some dictated their notes using speech recognition and transcription tools while in the room with the patient; others made handwritten notes during the patient visit and entered their notes manually or via dictation after the visit on computers located in a common area. Surprisingly, I observed very little avoidance or misuse of the system and documented few “workarounds,” presenting findings that stand in contrast to existing studies of EMR implementation (e.g., Gupta, Raja, and Khorsani 2014; Kane and Labianca 2011). For example, I observed no doctor entering false patient data to avoid an alert and no doctor actively avoiding use of the EMR. The dearth of instances in which I observed noncompliance provided disconfirming evidence to support the claim that caregivers at SWC, regardless of their attitude toward the technology and policies, remained compliant with local and federal policies for EMR use.

Healthcare workers’ observed compliance, however, stood in stark contrast to the attitudes and opinions some expressed in interviews. When asked about daily use of FileMD, doctors repeatedly responded with disdain for the types and amounts of work required to comply with federal standards. Disdain for one type of work, which I termed digital scut work, emerged as a theme in their responses. Digital scut work described data entry, data cleaning and organizing, and coding tasks that arose in conjunction with EMR
use. Some medical facilities—including two facilities included in this study and various others across the country (see Gellert et al., 2015)—employed medical scribes or other personnel to assist with these tasks; however, many doctors, nurse practitioners, nurses, and others at SWC had no choice but to complete these tasks themselves. An internal medicine doctor provided an example of digital scut work in his description of using the EMR for e-prescribing medicines:

We do e-prescribing, and so I write up the prescription with the software. I choose the number of days for the prescription to be filled, say 60 days before he has to come and see me again before a refill. Then I put in how many doses per day. From that information, you would think the system could figure this out, but no, I still have to calculate it myself and manually input how many pills the pharmacist should give the patient.

Similar accounts of frustration with seemingly menial tasks emerged in interviews with cardiologists. For example, EMR use policies allowed other healthcare workers, such as nurse practitioners and physician assistants, to record information in the EMR during a patient visit. However, when the visit included tasks that required doctor approval (e.g., medical prescriptions or diagnosis), the appropriate doctor had to “sign off” on the record and close out the patient’s chart. Using paper records, this task might have required the doctor to skim through a page or two of handwritten notes and make note of potential errors or omissions. The slight variation to interaction patterns with other caregivers was not what concerned doctors; rather, doctors were concerned because EMR elevated the amount of data they had to comb through: Predefined EMR fields demanded longer, more detailed notes than paper and therefore required significantly
more time on behalf of both the worker recording the notes and the doctor signing off on them. As one cardiologist put it:

*It can be frustrating. We had a PA [physician assistant] quit because she hated typing so much, she didn’t foresee that. And it trickles on down. I go to look at a note, say from a PA, and I’m clicking 40 times. Say the PA, PAs on average see like 15 to 20 patients a day, and I review the notes and sign off on them. So if the PA sees 20 patients, I’m clicking 800 times to catch maybe one or two things that are most of the time very minor.*

In the quote above, the cardiologist commented on the low utility of extra information recorded in the EMR, an issue discussed in detail below. The immediate point in raising this issue, though, again relates to the issue of time spent using EMR. In the process of member checking (Creswell and Miller, 2000), I raised questions with caregivers about the perception that EMR use added time to their days using the example of signing off on physician assistants’ notes. Internal medicine doctors noted that signing off used to consist of catching each other in the narrow hallway linking the patient visitation rooms between visits. With EMR, doctors dedicated portions of their days to completing this digital paperwork. The added digital scut work reflected in the examples above (e.g., having to calculate pill quantity for prescriptions and having to click 800 times in a day to access notes) was not simply an annoyance to the doctors at SWC; it had dramatic effects on an already-strained work-life balance. For example, when I asked informants how much time, on average, EMR use added to their work week, they often reported a minimum of four hours and often significantly more (e.g., an entire day of the work
week). Some of this additional time could be attributed to the level of detail required in the EMR notes, as opposed to the free form of paper notes, as this cardiologist noted:

*I’m spending three hours more per day, and that’s probably an underestimate, just trying to get caught up. I write my notes real-time, in the room with the patient, but then that leaves no time to answer the phone calls, to answer the people that have called in, or sign off on the labs. So I’m leaving at eight o’clock every single day of the week, after coming in at seven, and spending nights and weekends catching up. I don’t know if we can keep that up, so we’re looking for ways to cut that time down.*

Some caregivers, including the cardiologist above, clearly held concerns related to the new practices EMR required. Furthermore, caregivers at SWC were also concerned with how EMR use extended existing practices in ways that required more time to complete the practices on top of the additional tasks. Ordering lab tests, x-rays, or other procedures provided examples of how EMR use elongated practices at SWC. Only doctors could order some of these procedures, but nurses and nurse practitioners, based on experience, often immediately knew what a patient needed. As one nurse explained, with paper records, nurses and nurse practitioners would simply fill out the paperwork for the procedure using pen and paper. Similar to doctors signing off on PA notes, this act often occurred in a passing moment in the hallway with a simple verbal request, or as one nurse indicated, a tug on the sleeve, from the nurse to the doctor for his or her signature on the form. With EMR, nurses and nurse practitioners could not access the required documentation because the system restricted their access. Specifically, doctors carried a CMS-issued dongle on their keychains or in their pockets that produced an access code for orders such as prescribing controlled substances or issuing vaccinations. These gray,
plastic dongles, about two inches in length, had a small screen that produced a numerical code when a doctor clicked on a field that required a code. Therefore, the dongles were a system assurance that doctors filled out the order forms themselves; on no occasion during my site visits did any doctor hand the dongle to a nurse or nurse practitioner to enter the code. In other words, rather than quickly jotting their signature onto a form filled out by a trusted colleague, doctors now needed to manually enter the information into the EMR (and, as one doctor noted, needed to know where their car keys were at all times). An internal medicine doctor described how this type of digital scut work impacted his working day:

The nurses can't put the orders in, because they're not allowed. That means, if I'm going to keep working here, anyway, that means I go home and I enter them at night. There are so many orders that you can't do it all in a day, if you're also seeing patients. And sometimes, for things like prescribing hard meds, I need to do it pretty much immediately and can't even wait until I get home.

EMR use added time to doctors’ days and, according to some informants, cut into time spent with the patient. For example, some doctors found it easier to take notes by hand while visiting a patient, recording only what they deemed relevant and leaving other types of data collection to nurses and other health professionals. To be sure, some caregivers—such as one nurse practitioner at SWC—took pride in their abilities to use EMR while maintaining interaction with the patient. This SWC nurse practitioner demonstrated for me her strategy for preserving the interaction, angling her body toward the patient while leaving her fingers on the keyboard. Citing her ability to type without looking at the screen, she explained that she was able to maintain a practice that
caregivers often learn in their education and training: eye contact with the patient. She noted that the flexible displays—monitors that she could selectively angle toward or away from the patient—aider in her ability to maintain interaction with the patient while using the EMR. Others, particularly veteran doctors, expressed more concern with the actual amount of time EMR use required (e.g., form filling and correcting others’ mistakes) than the practicalities of interacting with patients in the visitation room (or what is sometimes referred to as “bedside manners”). Unwilling to compromise valuable time to accommodate electronic note taking, several doctors noted how they simply tacked on hours to their days, which caused problems in other areas of their lives:

_ I think I might be giving up 10, 15, 20 hours of my time a week to clicking, and that’s time when I used to see my family. I haven’t really thought about the toll it takes, on me or them, and it’s hard to think about because every day is just so busy. And we’ve always been busy, but I could justify… Well, using it [the EMR] is part of patient care, but I feel like it was easier to justify how I spend my time before two years ago._ [internal medicine doctor]

_ The patient and the doctor are both dissatisfied with that, a rushed visit, and any errors because of that rush, and then of course their waiting in the lobby as I try to catch up with my notes. So what am I going to do? My number one job is to take care of the patient, so I do that, and it’s… I end up having to do dictation and charting at home in the evenings…That cuts into my home time, my time with my family, and that can damage relationships. Let’s not even talk about how it cuts into sleep._ [internal medicine doctor]

Interestingly, a number of doctors reported that their attitudes toward the added workload were largely shaped by what they perceived to be the limited benefits of the extra work, a finding that somewhat aligns with Joshi et al.’s (1991) net equity implementation model (which emphasizes that acceptance or rejection of a technology
depends on how technology use influences the relationship between required effort and resulting advantages). Many caregivers remarked that the utility of the information contained in the EMR was low, yet the time and effort required to enter and sift through the information was high. Relating this belief to a concrete example of seeing a patient with a rare condition, one internal medicine doctor remarked:

*For example, I would see a patient with a very rare condition, acrodysostosis [congenital malformation], and I counted 54 data points I recorded when I saw this patient. The basics—vital signs, meds, potential side effects, symptoms, to come up with some ideas about what it could be. But when I saw this same guy, and had to use the EMR... I mean, when it was in front of me, I had... it had 300 data points that I had to complete. Most of them were completely irrelevant to my patient, or what I was doing to the patient. And it’s supposed to provide more information, better quality, but once all this data was collected you couldn’t find the important stuff. Before I just looked at the patient, I had an idea of what was important to check with this patient, the questions to ask. But then I have 300 things to check off in front of me, then you’ve got to go wading through it hoping you can find the relevant piece of information when you need it on the next visit.*

On nearly every visit to the fieldsites, I observed caregivers wading through the information displayed in the EMR to find relevant pieces. Asked about this process, several caregivers reported that they experienced an EMR reading “mode,” where they could scan pages of data points and text and extract what was meaningful for the present patient encounter. I confirmed this practice in subsequent visits, in which I noted caregivers quickly scrolling through records before visits.

In addition to requiring extra time to record what some caregivers perceived as low-utility information for patient care decisions, the data doctors entered made it easy
for administrators to track and evaluate progress through performance reports. In other words, the frustration doctors expressed in regard to the time the administrative tools added to their workdays was compounded by the fact that these tools provided a panopticon through which administrators could view and manage all of the staff’s activities. The consequences of involuntary use of the technology (e.g., digital scut work), coupled with the administrative benefit of data collection outweighing the value for patient care, was too much to handle for some medical professionals. Current employees of SWC relayed stories about colleagues both at SWC and across the country who decided that resigning from their positions was favorable over making the extra effort to accommodate EMR. As one internal medicine doctor explained:

*There’s a reason a lot of the seasoned docs are leaving, or leaving earlier than they would have, or taking less patients. Dr. Thomas is one here, taking less, and he’ll tell you, with more colorful language, that the health of patients is no longer the reason we’re losing sleep. We’re losing sleep because we need to satisfy administrative needs, we need to be reimbursed for what we do, and we need to not be penalized.* [internal medicine doctor]

When asked what they had done to voice their concerns to management, caregivers frequently reported that they knew that managers could do very little to shift policies in favor of less EMR use. They almost universally cited federal regulations in their responses, noting that strict Meaningful Use requirements put administrators in a difficult position. Indeed, many of the doctors at SWC could relate to administrative pressures because they themselves had once served in administrative roles or currently served as some type of manager. One internal medicine physician even noted, “It’s the
good guys—I know the guys who are putting out the ‘shit lists,’ and they’re not bad guys. They’re doing a job.” Caregivers at SWC, then, could do little to affect change within their own organizations.

In sum, the doctors charged with using EMR expressed frustration with the digital scut work EMR added to their existing practices, a finding that is not uncommon to studies of new IT implementations (e.g., Lapointe and Rivard, 2005; Markus, 1980); however, whereas workers can typically misuse, avoid, or rally against the IT to drive the organization and its managers toward replacement or customization, doctors had no such ability under the federally-mandated EMR program. Caregivers of all types at SWC could do little to resist the technology locally because of federal policy, so doctors and others continued to comply with the policies. However, the use of managerial strategies for gaining compliance with federal standards for use of the technology induced a feeling of unsustainability and loss of control over day-to-day activities, an application of EMR that moved them closer to taking action outside of their organizations. I discuss caregivers’ movements against the EMR program in the following chapter.
Chapter 5: Findings Part 2: National Resistance to the Federal EMR Program

Doctors and other healthcare professionals were unsatisfied with the changes mandatory EMR implementation introduced to their practices and the degree to which managers used compliance strategies to extend managerial control over their work. However, the findings presented in Chapter 4 indicated that these workers were not outright rejecting the technology; rather, healthcare workers were managing digital scut work by taking on longer working hours and developing skills that helped them to sift through the overload of information contained in the EMR. Several of the informants noted that longer days were an unsustainable solution to the problems that accompany mandated EMR use. Furthermore, healthcare workers were stuck with the technology their organization chose to adopt and had little ability to customize given the EMR mandate. In interviews, caregivers voiced their concerns over EMR’s encroachment on their work-life balance and the management of their work; however, they took little action to combat the changes locally, as we might have expected to see in non-mandated IT implementations.

Recording this evidence from EMR implementation in a single organization proved useful for examining how organizations can successfully translate federal technology policies into local practices that will ensure compliance with the policies. It also uncovered some of the sentiments we might expect to see emerge among workers in various industries as their day-to-day lives revolve more and more around policy-guided
use of digital infrastructure technologies. However, a broader perspective than one focused on a single organization was also needed to fully capture how workers responded to the ever-increasing presence of policy-driven digital infrastructure technologies and to answer RQ2, which asked how workers might resist IT when they cannot do so within their organizations. In this particular case, professional organizations acted on behalf of locally disenfranchised workers to resist the federal program at the national level, rather than at the point of technology use, a finding that holds implications for the description and analysis of mandated digital infrastructure IT implementations.

Instead of conceding defeat and accepting the fundamental changes EMR made in their lives, healthcare professionals channeled their frustrations into collective action by leveraging the political power of professional organizations akin to the AMA. Similar to previous labor union actions in response to various types of technologies (see Kelley and Harrison 1992; Montgomery 1979; Tauman and Weiss 1987; Weill, 1994 for examples; see Chapter 6 for further exploration), the AMA’s leaders recognized that its members were somewhat helpless to resist top-down changes to their everyday work within their own organizations. The AMA and other healthcare professional organizations, though, held the ability to influence and resist the federal policies responsible for the imposition of EMR in caregivers’ everyday work. These organizations were capable of such actions in part because they had a direct line to government officials. For example, in 2014, the AMA spent over $19 million on lobbying efforts on Capitol Hill to urge politicians to consider the organization’s ideas about other issues, including medical education,
malpractice reform, and healthcare technologies (OpenSecrets.org, 2015). Many of these lobbying efforts aimed to sway individual members of Congress to vote one way or another on particular issues. The AMA and other professional organizations used some of these same tactics in mobilizing against the federal EMR program; additionally, they openly and directly addressed entire federal agencies, such as the Department of Health and Human Services, to voice their concerns over the program.

Below, I explain how healthcare professional organizations successfully mobilized against the EMR program by exploiting both formal political communication and informal mobilization techniques. Practically, their actions resulted in a delayed rollout of Stages 3 and 4 of the Meaningful Use program and recognition from the DHHS, CMS, and ONC that the program was in need of reevaluation. Their success in this effort demonstrated the need for scholars’ theoretical consideration of resistance that occurs beyond the point of IT use, a form of pushback against new IT that may become increasingly common as government agencies strive to mandate digital infrastructure technologies.

FOUNDATIONS OF THE ANTI-EMR PROGRAM MOVEMENT: FORMAL POLITICAL COMMUNICATION BETWEEN AMA LEADERS AND THE FEDERAL GOVERNMENT

Professional organizations such as the AMA began crafting anti-EMR program strategies to bring the program’s shortcomings to regulators’ attention as early as 2011, two years after the Obama administration issued the HITECH Act. According to an AMA representative who directed the organization’s efforts on healthcare IT, the AMA was
careful not to frame the resistance movement as opposition to new technology in general. She explained that doctors and other caregivers were not “Luddites” and that the object of resistance was not EMR itself; rather, it was the bureaucratic reach of the federal government in deciding how EMR were designed and used. As evidence of this claim, she noted that the healthcare community had discussed the potential of EMR long before the 2009 HITECH Act, an assertion that is further supported by publication of discussions in journals including *The New England Journal of Medicine* (e.g., Tierney et al., 1990) and *The Journal of the American Medical Informatics Association* (e.g., Barrows and Clayton, 1996). These discussions often framed EMR as a technology with a positive potential for increasing the efficiency and quality of healthcare delivery. However, as time passed and the realities of what IT might mean for the practice of medicine came into view, these discussions proceeded with some hesitation about what the impact of EMR might be. The AMA representative noted:

*The medical community talked about electronic medical records in the 1990s, probably earlier. I mean, it’s something that I think the community always desired, always thought of as, “If we could find a way to make this work for us and for our patients,” and so we’ve always had pipe dreams of that, but of course we didn’t want that to be at the expense of the patient-provider relationship, of time spent with patients, patient safety, things that are really central to us. And the early tech, the systems could be at odds with that.*

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3 The term “Luddites” refers to a group of British textile workers who, between 1811 and 1816, actively destroyed machines that were poised to reduce the number of textile workers. The term is used colloquially to refer to individuals or groups who are relatively opposed to modern technologies and the changes they occasion. See Grint and Woolgar (1997) for a more detailed explanation.
Accordingly, some leaders in the medical community reacted with either pause or excitement to the 2009 federal HITECH Act. The Act, in its initial instantiation, was fairly general and set out some goals that policymakers could seek to attain using IT, with a subsection dedicated to addressing the need for widespread EMR implementation and the construction of a national health information exchange. The plans for reaching these goals grew more and more specific as policymakers at CMS developed the Meaningful Use program. Two CMS representatives referred to the HITECH Act as a “schematic” and the set of Meaningful Use standards as an “instruction manual” or “standard operating procedures.” CMS’ attempt to frame the EMR program in this concrete way stood in contrast to the nuanced and cautious stance the medical community had taken toward EMR in previous decades. “It demonstrated a lack of awareness on their part,” one AMA representative said, “It was as if they thought they knew better than us.”

When asked why professional organizations did not resist during the design phase of the program, some representatives reported that a lack of transparency in the design process, breakdowns in communication between the AMA and federal government, and the immense political and social momentum of the Obama administration’s ARRA were contributing factors. For example, one representative asserted that partnerships between CMS and major EMR vendors began a year or more before CMS solicited the input of the medical community. This assertion was later confirmed by a CMS agency worker who solicited proposals from vendors during the early stages of program design. He explained,
Of course we were [forming partnerships]. For one thing, there weren’t even many vendors at that time who ... had developed the software to the point of being able to share data across different hospitals and offices. There were maybe four or five at the time, and so of course we reached out to them first. And you could maybe argue that it’s still the same today.

Similarly, both AMA and CMS officials admitted that direct communication between the medical community and federal policymakers was lacking. Three AMA representatives described it as “the right hand not knowing what the left is doing.”

Reasoning for these breakdowns was difficult to tease apart, but one commonly-identified reason related to another theme in the responses—the political and social momentum of the Obama administration’s $831 billion ARRA stimulus package, of which HITECH accounted for $33 billion (CBO, 2012). One CMS worker responsible for relaying information from ONC and other federal agencies to relevant CMS channels emphasized ARRA’s focus on “shovel-ready projects,” or recovery and reinvestment projects that could begin immediately rather than requiring years of planning and coordination.

Indeed, the HITECH Act included some language referring to the favorability of using funds for IT that could have an immediate impact on the efficiency and quality of healthcare delivery. For example, a major provision of the Act was that the $2 billion initially delegated to ONC for healthcare IT must “begin to be spent within 90 days of the legislation being signed into law on items such as the infrastructure necessary to allow for, and promote, the electronic exchange and use of health information for each individual in the United States” (HIPAA.com, 2015: n.p.).
The haste with which federal agencies began rolling out the EMR program undoubtedly contributed to the medical community’s inability to resist the program during the design stage. However, the most common response to questions about the issue of proactive resistance to the program—from 7 out of 10 professional organization representatives with whom I spoke—was that caregivers needed their professional organizations to focus on other, seemingly more pressing, issues such as potential shifts from fee-for-service to fee-for-performance payment structures.\(^4\) It was not until the medical community began realizing that EMR could be used as a facilitator of these bureaucratic shifts—such as by tracking caregiver performance based on EMR data and using the output to quantitatively assess patient outcomes—that disdain for the program became visible. AMA representatives discussed the frequency with which disdain for EMR began appearing in AMA newsletters, forums, and meetings, which my review of these sources confirmed. For example, 26 of AMA’s 50 “Advocacy Update” newsletters from 2015 and 2016 centered on issues related to EMR, with 14 of these updates discussing how EMR use relates to payment and insurance reform, patient and caregiver privacy, and other salient issues. The remaining 24 updates addressed EMR and Meaningful Use directly, often rallying against the program and its latest developments.

\(^4\) “Fee-for-service” refers to a payment structure in which caregivers or healthcare organizations receive insurance payments based on the actions they took to evaluate and treat a patient; “fee-for-performance” refers to a payment structure based on the stabilization or improvement of the condition of the patient, regardless of the actions performed. For a more detailed explanation, see Chernew (2010).
AMA leaders reported that they recognized the tendency to bound the EMR debate to other popular debates in the medical community as an opportunity. As a result, the AMA put EMR at the front and center of discussions about various types of political changes. One such document that stands as testament to this strategy is a letter signed by the AMA and 41 other professional organizations through which physicians and other healthcare workers urged DHHS Secretary Sylvia Burwell to delay or cancel Stage 3 of Meaningful Use. The letter indicated that although healthcare workers may have been compliant with federal standards for EMR use in their local settings, the signers recognized that the program was far from a universal success and instead exacerbated other concerns facing caregivers. The professional organizations that signed the letter asserted that they would begin exploring opportunities to influence reform of federal policies:

The undersigned medical societies agree that interoperable, useable, and clinically relevant Electronic Health Records (EHRs) [same as EMR] are the essential foundation for the implementation of Merit-Based Payment System (MIPS) and Alternative Payment Models (APMs). The physician community, however, is extremely concerned with the current direction of the Meaningful Use (MU) program. To date, 80 percent of physicians are utilizing EHRs, but less than 10 percent of physicians have successfully participated in MU Stage 2. Furthermore, due to the inflexible MU regulations and certification requirements, vendors have created software products that are frequently unusable, administratively burdensome, and in many instances do not promote clinically relevant patient care.

The physician community is extremely dismayed by recent press reports that the Final Modifications Rule and the Final MU Stage 3 Rule have been combined and this rule is now under review at the Office of Management and Budget (OMB). If the
administration finalizes the proposed MU Stage 3 regulation now, vendors will create software that will lock-in problematic technology, which physicians and patients will be living with for years to come.

Healthcare workers’ concerns about the federal EMR program extended beyond problematic technologies. The letter to the federal government also indicated that the evaluation methods tied to the technology could lead to unexpected or undesirable outcomes. Specifically, it echoed the sentiments of some of SWC’s interview participants regarding the problems with deploying administrative functions of the EMR to both gain compliance and track caregiver performance. One physician at SWC viewed compliance standards and their enforcement as attempts to “make all providers the same, and make all patients the same,” a perspective that was evident in the letter to Secretary Burwell of the DHHS, which continued:

*The proposed MU Stage 3 regulation exacerbates problematic policies of MU Stage 2 by continuing to “count” physicians’ compliance with one-size-fits-all objectives rather than focusing on the clinical activities that should support differences in medical practices and patient care. We believe Stage 3 takes a drastic step backwards from the proposed improvements of the Modifications Rule.*

In this part of the letter, the signers argued that contextual differences between healthcare organizations, caregivers, and patients should be taken into account not only when designing or choosing EMR technologies, but also when deciding how to deploy them in healthcare administration. A CMS agency official, when prompted with the text of the letter, recalled that expansion of EMR administrative functions—which was set to be a
major goal of Stage 3—was the primary target of caregivers and professional organizations who submitted comments on the program to CMS. He clarified the language around the Modifications Rule, or CMS’ amendments to existing Meaningful Use standards, explaining that professional organizations and caregivers were “wildly passionate” about the issue and were upset that CMS did not ease the requirements to use EMR to track and evaluate caregiver performance.

The AMA and its cosigners’ arguments also mirrored other aspects of workers’ localized frustration, such as the complaint about the imbalance between the work required to use EMR and the (dis)advantages EMR use presented. In particular, the AMA pointed out that the fundamental promise of EMR—seamless exchange of data within and between medical organizations—had fallen flat upon rollout of the program. Healthcare organizations could not, as once hoped by the National Coordinator for Health IT, leverage the interoperability and “data fluidity” of digitized records; instead, they faced challenges sharing even single patients’ records with other, local organizations. Just as cardiologists at SWC derided the need to continue requesting or sending documents via fax machines post-EMR implementation, the AMA took aim in the same letter at the “spread of poor performing systems” making an already taxing situation worse:

There seems to be a view among some policymakers that by requiring more certified EHRs to populate the landscape the systems will achieve interoperability. The physician community

5 In an August 2, 2013 speech at the Aprima User Conference in Dallas, TX, Dr. Farzad Mostashari, then the National Coordinator for Health IT, touted the potential benefits of the EMR program. Among his major points was EMR’s ability to quickly make data exchange an easy process.
strongly disagrees, and we are concerned that spreading poor performing systems may exacerbate the problem. Instead, we believe key interoperability challenges need to be addressed first so that the systems entities adopt will be capable of facilitating the seamless exchange of data.

In addition to the AMA and signatories’ letters, public statements such as those by AMA president Steven J. Stack, M.D. also indicated that the AMA and other professional organizations were optimistic about their abilities to shift federal policy and successfully resist the EMR program:

*There is growing bipartisan recognition in Congress that the direction of the Meaningful Use program needs to be reassessed in light of usability and interoperability challenges with electronic health record systems.*

*We believe that pausing Stage 3 at this time will provide the opportunity to evaluate the environment as we work with the administration to implement the needed changes found in the Modifications Rule. There are so many questions surrounding creation of MIPS and APMs that it is premature to proceed with MU Stage 3, especially since EHRs and MU will serve as a foundation for the success of these programs.*

Note that in these letters and statements, professional organizations and their leaders are careful to frame their arguments in terms of the policies guiding EMR adoption and use, rather than aiming at the technologies themselves. As I discuss below, this rhetorical strategy was always present in the AMA’s communications with its members and policymakers; however, it became increasingly central to the message and ultimately proved useful in shaping the direction of the federal EMR program.
MOBILIZING CAREGIVERS AGAINST EMR POLICY: THE AMA’S “BREAK THE RED TAPE” AND “PHYSICIANS GRASSROOTS” MOVEMENTS

Signs of progress for healthcare professional organizations in resisting EMR implementation at the national level suggested that they intended to continue their efforts until a desirable solution emerged. The AMA stood at the forefront of the resistance movement and represented the face of anti-Meaningful Use efforts, but other professional organizations were undoubtedly in agreement about the need for major policy changes, as evidenced by the long list of organizations that signed onto the AMA’s communications with the federal government. Formal communication captured the attention of policymakers prior to the proposed start of Stage 3 of Meaningful Use and, according to one CMS official, prompted federal agencies to begin assigning employees to solicit feedback about federal EMR policies. The AMA again mobilized its resources to ensure that caregivers across the U.S. could submit this feedback. I traced the national resistance effort through two phases to uncover the mechanisms by which the AMA carried out this movement: An early phase focused specifically on EMR policy, known as the “Break the Red Tape” movement, and a second phase that tied together EMR with other political issues facing doctors, which was rebranded as the “Physicians Grassroots” Movement. The two phases made distinct arguments and thus demonstrated differing rhetorical strategies for mobilizing caregivers against the EMR program.

The Break the Red Tape Movement

The AMA launched its Break the Red Tape Movement around the same time that it began sending formal letters to DHHS and members of Congress. Through various
avenues, AMA sought to collect, manage, and transmit caregivers’ grievances against EMR. The movement comprised a website presenting some of the AMA’s core arguments against the program with infographic-like images (see Appendix A for some examples), a series of three townhall meetings in Boston, Atlanta, and Seattle, and communications with the federal government (through letters, emails, and videos). As AMA representatives from the Physician Advocacy and Professional Satisfaction divisions explained, the purpose of the Break the Red Tape movement was to “bombard” or “flood” members of Congress and federal agencies with individual caregivers’ testimonies about EMR while also making these grievances highly visible to other caregivers and the general public. In their view, the latter strategy would reinforce the former (i.e., once some caregivers posted testimonials, others would observe them and record their grievances, too). The website offered predefined text forms for emailing members of Congress or agency officials, which resulted in over 3,000 emails, according to an AMA representative.

AMA representatives noted that emails had captured attention of the government, but that the movement needed to generate ideas about how to proceed with the program. One representative explained that by the end of the first month of the movement, he could surmise that the medical community…

... has had it with the rules [surrounding EMR], and not the technology itself. We know it’s reality, we know it’s here to stay, but we wanted to have our say in the rules, in making them and in changing them.
The first step in shaping the rules was stalling the progression of Meaningful Use stages so that the list of features and uses required by federal policy did not expand and further detract from caregivers’ work. AMA leaders were uncertain of what would happen if they could get the program stalled, but knew that doing so would be a rallying point for constituents. As one representative noted, “We had no plan in place for what would happen if they said, ‘yes, we’ll pause the program,’ but we wanted to put that out there as a stated goal.”

Although caregivers and their professional organizations wield considerable political and social influence, they struggled to adopt a stance that went beyond criticism to offer policy recommendations, which they knew would be central to putting forward a winning argument as to why the program should be delayed. The Break the Red Tape website, in particular, appeared to encourage complaints rather than suggestions. At the Atlanta town hall meeting, for example, a doctor from Athens, GA (specialty unknown) commented on the website and its message, pointing out that it did not propose any solutions. “It’s whiny,” he said, “and it’s a laundry list of complaints. The colors, the messages, it’s all too dark.” AMA representatives reported receiving similar complaints via the “Contact Us” link on the page and a comment to a similar effect was published in an opinion piece of a July 2016 AMA newsletter. Other representatives echoed this sentiment, with one individual adding that the AMA felt it important to drum up an already-present feeling of anti-bureaucracy among doctors and to do so in a way that “softened the complaining, but ramped up the action.”
The Break the Red Tape effort—specifically, the website—was, indeed, viewed by many members of the medical community as “arm-chair-criticizing” (in the words of an AMA Advocacy representative). The feedback AMA representatives received about the website included adjectives such as “whiny,” “complaining,” “backwards,” and “dark.” Still, it appeared to have captured the attention of CMS and other federal agencies who, when asked about the movement, confirmed that the DHHS was considering soliciting feedback about policy changes. When asked about the AMA’s influence on the delay, administrators from CMS were varied in their responses. Some attributed the delay directly to the AMA’s efforts to sway members of Congress; others believed it was due to the calls, letters, and email caregivers sent directly to CMS and ONC; and still others believed the delay had more to do with declining Meaningful Use compliance rates in Stage 2 than the actions of professional organizations.

Despite succeeding in delaying Stage 3, the AMA’s leaders knew they had to continue attempting to influence the federal EMR program. The organization decided to shift its message to address (a) a number of non-EMR related issues and (b) the “complaining” tone with which some constituents took issue. The Break the Red Tape Movement formally became the Physicians Grassroots Movement in October 2016, with Break the Red Tape’s website URL automatically redirecting visitors to the new movement’s website.
The Physicians Grassroots Movement

The Physicians Grassroots Movement still placed emphasis on issues related to EMR, but married these issues with others, including telemedicine, the opioid epidemic, and graduate medical education (see Appendix B for some examples). Furthermore, the wording in the movement’s messages became more positive than that associated with the Break the Red Tape Movement and hinted at ways of moving policies forward to address the concerns the movement raised.

Asked about these changes, AMA representatives provided practical reasons for shifting the message. For example, the explicit reason the AMA wanted to shift from a negative tone to a more positive message was to convey that doctors were no longer trying to “stall Meaningful Use,” but that they were now trying to “influence or improve Meaningful Use.” As one representative told me,

We know we have them [the Federal Government] on the ropes. They finally have to listen to us on the IT issue, and we wanted our members to know that. We wanted them to see clearly that yes, we did raise their [caregivers’] voice, and that’s a message we want to get across so that they stick with us on this, and on everything else to come.

But as several informants noted both at the AMA and at CMS, those involved in determining the future of the EMR program perceived that the shift in the movement was also about reasserting the power of the AMA and of doctors as a profession. One theme that emerged in response to questions about mobilizing doctors related to disenfranchisement of the doctor and how evolving technologies, shifting organizational structures, and changing regulations had placed doctors in a seemingly unprecedented
political position. Triangulating data (Creswell and Miller, 2000) from interviews with AMA representatives, CMS administrators, and primary source data served to solidify the claims of various participants about the novelty of physicians’ current political situation. For example, a CMS administrator elaborated on a response to a question about other issues facing the medical community and how the issues might relate to the federal EMR program. As he explained,

*For the first time maybe in our history, docs are in a way the low guys on the totem pole. Or at least they’re the ones with no real way to go up from here. You hear about technology replacing the doctor, things like [IBM] Watson, but we’ve had these other changes happening at the same time. PAs [physician’s assistants] and NPs [nurse practitioners] doing more, insurers wanting them to do more, so that’s why you see them talking about telemedicine, too, talking about graduate education, too—they want to take back some power everywhere, not just what they might lose to health records.*

Linking the message about EMR to other issues facing caregivers—other IT issues included—was, according to officials, a conscious decision. On one hand, framing national resistance to EMR in this way is interesting in juxtaposition to the seemingly far-off promises of EMR and a digital infrastructure for healthcare. Visions of a seamless healthcare information exchange fell short in the first several years of the EMR program. In September and October 2016, the first attempts at centralizing data from the federal program’s participants began. CMS built a publicly-available spreadsheet registry of 292 providers with contact information, location, and types of data available (namely, Immunization Registry Reporting, Syndromic Surveillance Reporting, Specialized
Registry Reporting, Electronic Reportable Laboratory Result Reporting, Electronic Case Reporting, Public Health Registry Reporting, and Clinical Data Registry Reporting) (CMS, 2017). Of the 292, none reported the full set of reporting categories; the highest performers were four organizations that reported six of the seven types of data, all lacking Electronic Case Reporting. One of the highest performers was a state Medicaid agency; another was a private national healthcare organization appropriately named “ReportingMD®” (a company focusing on data-centric healthcare); and one was a privately-owned national public health registry. The fourth was California Medical Systems, a practice management/EMR consulting firm. In sum, two of the participants in the registry were active providers of healthcare; two were technology firms.

On the other hand, the success of technology firms in meeting reporting criteria may speak to their ability to meet CMS guidelines and deploy a wider range of data aggregation capabilities than were currently being deployed in healthcare facilities. To be sure, the registry was expected to grow, and the true data aggregation outcomes for healthcare facilities remain to be seen to this day. But the early evidence has suggested that efforts to expedite the adoption decision and implementation processes of organizations via federal policies may not rapidly or sustainably grow the infrastructure. As one CMS administrator noted,

*In the public realm, at least, we need to take a look at what has worked and what hasn’t. I don’t know how programs like this [the federal EMR program] might ebb and flow with different changing of guards [presidential administrations and Congressional changes]. But I think there’s always going to be interest, and*
there’s going to be interest in doing in across the board. We’ve learned here, and we’ll probably learn again and again, that it’s not an easy way.

In this case, rapid diffusion and use of a digital infrastructure technology confronted powerful professional organizations, who recognized that their members were struggling to accommodate the changes associated with mandated EMR. These organizations were able to help slow and alter the transition in favor of professional interests, constituting a mediated worker response to the technology implementation that was shaped by managerial responses to the implementation. Figure 6 depicts this scenario, in which the outlet for resistance rose up a level—from the point of IT use within the organization—to affect change at the national level.

Figure 6: National Resistance to EMR Implementation
In Figure 6, Phase 1 was characterized not by an organizational adoption decision as it was in traditional IT implementations; instead, organizations simply chose an EMR from one of a select few certified EMR vendors to comply with the policy mandate. Vendor selection did not depend upon what made sense for the organization’s goals, budget, and worker characteristics; rather, administrators sought an EMR that would remain in compliance with federal regulations. Phase 2 looked similar to traditional implementations in that SWC workers underwent a training period involving the EMR vendor, IT staff, managers, and caregivers. Phase 3, however, again differed from traditional implementations in that workers’ initial responses to EMR were negative, yet they could do little to act upon their frustrations with the change in their day-to-day activities. The use phase, then, was characterized not by resistance, but by resigned frustration. Whereas we might usually expect managers to respond by customizing or replacing the IT, managers at SWC instead deployed compliance-gaining strategies to ensure that workers remained compliant with federal policies. Additionally, managers were able to use panoptical features of the EMR to tighten their control over caregivers’ work. Caregivers perceived this tandem of EMR uses as an affront and, rather than resisting locally, routed their resistance through powerful professional organizations. These organizations used existing and new means of creating political change to stall the EMR program at the national level, effectively regaining some control over the IT implementation process.
In light of this new model of resistance to policy-driven digital infrastructure development, we might begin to explore concepts and theories that can help to explain how and why resistance to IT takes place beyond the boundaries of the organization. To begin this effort, I discuss the theoretical challenges posed by the new model of resistance and draw upon institutional theory and social movement theory as possible locations for solutions to these challenges. I also discuss the methodological approaches we might take in studying future digital infrastructure development programs before concluding with limitations and directions for future research.
Chapter 6: Discussion: *Theoretical Approaches for Studying Resistance to Policy-Driven Digital Infrastructure Development*

The EMR program in the U.S. healthcare industry demonstrated how policy-driven IT implementations may engender resistance from workers, a finding that sits at odds with previous studies of digital infrastructure development efforts in industries such as scientific and academic research. Organizations typically adopt digital infrastructure IT gradually and include workers in the adoption decision, measures that reduce the likelihood of resistance once the IT is deployed. However, federal policies spurred rapid adoption of EMR and left organizations with a selected set of vendors from which to choose. Diminished organizational control over IT adoption decisions is rarely documented in the literature on digital infrastructure development or the literature on IT implementations more broadly and, therefore, requires exposure to theoretical concepts.

Furthermore, once the organization implemented EMR and inevitable frustrations arose, managers could do little to customize or replace EMR due to federal certification requirements. Managers instead implemented EMR with its “off-the-shelf” features, which they found included panoptical features that permitted quantitative tracking and evaluation of caregiver EMR use and overall performance. These features helped managers to develop compliance-gaining strategies to ensure that caregivers met the standards for use required by Meaningful Use regulations. In other words, caregivers could not misuse or underuse the EMR without it being held against them in evaluation of their work. In contrast to what existing explanations of IT implementations predict
(e.g., Lapointe and Rivard, 2005; Joshi et al., 1991; Marakas and Hornik, 2001; Markus, 1983), caregivers could not resist the IT implementation within their organizations because of these consequences. Even if caregivers could resist at the point of IT use, neither organizations nor managers had the flexibility to customize or replace the IT under federal policy. Therefore, the form resistance ultimately took differed from the localized forms of resistance documented in existing studies of IT implementations in organizations. In particular, caregivers engaged in national resistance by leveraging the political power of their professional organizations to delay the progression of Meaningful Use stages, effectively stalling the further imposition of EMR into their day-to-day activities and professional lives. The model presented in Figure 6 visually represents the emergence of national resistance at a level above what typically happens when a new IT is introduced in an organization (i.e., beyond the boundaries of the organization.

The emergence of national resistance suggests that even in the face of strict policies restricting what they can do at the point of IT use, workers may route their resistance through external actors such as professional organizations to resist policy-driven digital infrastructure. This finding is also novel relative to the existing digital infrastructure development and IT implementation literatures and would benefit from theoretical attention. Existing studies of digital infrastructure development—such as those that examined development in scientific research enterprises—do not develop concepts, models, or theories to demonstrate the dimished role of organizational choice, the increased presence of managerial compliance-gaining strategies, or the process of
localized frustration emerging into national resistance rather than localized misuse or
disuse of the IT. I draw upon institutional theory and social movement theory to discuss
the opportunities for accommodating both diminished control over IT adoption decisions
and alternative forms of resistance in explaining policy-driven digital infrastructure
development. I then explore the types of methods that testing and refining the new model
of resistance might require.

THEORETICAL IMPLICATIONS: EXPANDING THE CONCEPTUALIZATION OF RESISTANCE
This section contextualizes the findings of the study of the EMR program within the
literatures on digital infrastructure development and resistance to new IT while adding
insights from institutional theory and social movement theory. In synthesizing these
theoretical lenses and applying them to the findings, I aim to expand the
conceptualization of resistance by explaining and generalizing the model that I developed
throughout the findings chapters (repeated below in Figure 7). With further development,
this model could provide a foundation for (a) acknowledging that policy-driven IT
implementations diminish organizational control over the IT adoption process and thus
make resistance likely to occur and (b) predicting the various forms resistance might take,
including national resistance, depending on the opportunities for resistance available to
workers charged with using a new digital infrastructure IT. I explain how employing
institutional theory and social movement theory might help to build a comprehensive
view of resistance, using the findings from this study as a starting point.
Using Institutional Theory to Understand Digital Infrastructure IT Adoption in Policy-Driven Programs

The EMR program and similar policy-driven digital infrastructure programs represent top-down approaches to implementing new IT (Barrett et al., 2015), which necessarily includes external actors making decisions about IT adoption and use on behalf of the organization (as represented by the addition of a Policy Mandate in Phase 1). Institutional theory is particularly useful in exploring why policy-driven implementations of digital infrastructure IT might engender resistance, specifically as it relates to Phase 1 of implementation. In terms of IT adoption, few existing frameworks accommodate external influences on organizational adoption decisions. Institutional theory provides a partial way forward because it acknowledges that actors within an organization’s institutional field (i.e., the environment in which an organization operates, comprising other organizations, regulatory agencies, policies, and market conditions,
among other elements) can influence IT adoption decisions, rather than construing IT implementation as a purely rational organizational choice (Greenwood et al., 2010; Lawrence et al., 2009). The concept of isomorphism, for example, holds that organizations tend to adopt structures, processes, and technologies that are similar to those adopted by other organizations in the immediate environment (Dacin, 1997; Deephouse, 1996; Haveman, 1993; Lai et al., 2006; Mizruchi and Fein, 1999). These similarities arise because certain structures, processes, and technologies gain legitimacy, either for rational reasons (e.g., observed improvement in the performance of organizations that adopt the change) (DiMaggio, 1997) or because the change is deemed “societally appropriate” for non-rational reasons (Meyer and Rowan, 1977).

In the case of policy-driven digital infrastructure development in healthcare, EMR were deemed “societally appropriate” by federal agencies like CMS and ONC, perhaps because data-driven approaches to organizational and societal problems are increasingly popular. The increased role of government agencies relative to infrastructure developments in industries such as science indicate that researchers might need to look at all of the actors in a given institutional field to provide comprehensive understandings of how infrastructures are created, are grown, and are shaped through both local and national processes.

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6 Evidence of EMR providing performance improvements or other rational reasons for adopting EMR was, as of 2009, inconclusive. Active debates over the potential benefits of EMR were present in the medical and medical informatics literatures prior to the 2009 HITECH Act, with at least 23 studies providing evidence of performance improvement and 18 reporting no significant improvement. These findings suggest that the decision to implement EMR nationally was not entirely rational.
In the context of policy-driven EMR implementation, the healthcare organization that I studied directly responded to influences in their institutional fields even though they did not perceive the change as entirely rational. As evidence, SWC utilized EMR in a patchwork fashion prior to the policy mandate: They deployed EMR where it improved practice or facilitated communication with other healthcare organizations, rather than universally implementing EMR across all departments. Under the mandate, though, the source of change was entirely external, aligning with the institutional view that not all organization changes are internally- and rationally-selected (Jepperson, 1991; Scott, 2001). Applying this understanding of external influences on IT adoption can aid in understanding why, contrary to best practice, workers may not be included in the digital infrastructure development’s design and therefore may be more likely to resist than they would be in implementations within single organizations.

Following this reasoning, institutional analyses routinely demonstrated that when change processes initiate from outside the organization, resistance is likely to occur among the groups that stand to lose most from the change (Bauer, 1997; Suddaby et al., 2007; Yoo et al., 2012). Scenarios in which changes are externally imposed are likely to be met with resistance because individuals or groups of workers within the organization may not perceive the new structure, process, or technology as legitimate or they perceive it as a threat to the stability of the institutions with which they identify (Bauer, 1997). For example, Carter (1984) documented how the introduction of computer technologies contributed to the development of new organizational forms in the newspaper industry.
Because the change was externally imposed (i.e., computers were not developed by newspaper editors, writers, and other staff, but rather imported from other office settings), some workers in the industry perceived computerization as a threat and adamantly resisted their organizations’ attempts to implement the new technologies. Similar responses to technological changes from external sources emerged in the radio industry (Leblebici et al., 1991), the energy industry (Bauer, 1997), and the education industry (Blin and Munro, 2008).

The prevailing institutional explanation for why new IT introduced from outside the organization spark resistance is that new IT necessarily carry with them institutional logics, or “symbolically-grounded organizing principles that underpin individual practices in a manner consistent with a given institution” (Friedland and Alford, 1991: 242). For example, IT often aim to structure work in a way that is amenable to quantitative evaluation and planning, a logic often referred to as managerial rationalism (Lea, 1991; Campbell, 1999). Sometimes, IT that stem from outside of the organization may carry with them logics that prove to be incompatible with the logics that guide an organization’s workers (e.g., Berente and Yoo, 2012; Gosain, 2004; Lounsbury et al., 2009; Thornton and Ocasio, 2008). When the logics inherent in the new IT—such as managerial rationalism—conflict with the dominant logics of the organization or groups within the organization—such as belief in flexibility and creativity—resistance is likely to emerge (Greenwood et al., 2010; Yoo et al., 2012).
This perspective helps to explain why resistance emerged in response to the policy-driven digital infrastructure IT implementation in healthcare, whereas resistance did not in previous studies of digital infrastructure development. Specifically, previous studies of digital infrastructure development documented instances in which organizations and their workers were heavily involved in IT adoption (and, in some cases, IT design) decisions. As a result, workers such as biological scientists (Edwards et al., 2007) could minimize conflicts between the logics inscribed in the IT and the logics that characterized their organizations and professions. In contrast, healthcare organizations and caregivers in the EMR program had little input into IT design and adoption decisions; instead, EMR vendors and federal government agencies inscribed the values, beliefs, and organizing principles set forth by the HITECH Act into EMR and Meaningful Use standards.

The logics inscribed in EMR ultimately conflicted with the logics that guided caregivers’ practices and prompted resistance. One example of conflicting logics at SWC was managerial use of checks on patient outcomes, such as blood pressure control. The EMR identified doctors whose patients fell out of a “normal” blood pressure range for patients of similar age or condition. Whereas administrators (and perhaps the designers of the EMR) viewed this feature as a logical extension of practicing medicine according to the best-available evidence, doctors viewed the feature as an affront to their understanding and mastery of patient care. One internal medicine doctor noted that with EMR, a “holistic” approach to medicine—a phrase he used with caution and hesitancy
due to its “unscientific” basis—was rendered impossible; instead, EMR use demanded that patients be treated as a set of discrete data points and that each of those data points be kept close when considering treatment options.

Institutional concepts such as isomorphism and institutional logics aid in explaining why resistance, which had previously been absent from accounts of digital infrastructure development, emerged in response to the policy-driven digital infrastructure program in healthcare. However, institutional concepts do little to help us to understand the mechanisms by which workers resist a new technology when localized resistance, such as rejection or misuse of the technology (Joshi, 1991; Lapointe and Rivard, 2005; Markus, 1983), is impossible due to regulations or other mandates for technology use. In other words, institutional theory predicts when resistance is likely to occur, but leaves unanswered the question about how it might occur in Phases 3 and 4 of implementation. The findings presented in Chapter 5 suggest that one way workers might resist is through national resistance, particularly when workers have the ability to unify and mobilize through outlets like professional organizations.

**Employing Social Movement Theory to Explain Mechanisms of National Resistance**

In general, scholars of technology and work have not construed large-scale opposition to new technologies as “resistance.” Indeed, resistance has taken on a very particular meaning, and one of its common characteristics is that it occurs at the point of use or within the organization implementing the technology (Joshi et al., 1991; Lapointe and Rivard, 2005; Marakas and Hornik, 2001; Markus, 1983). Existing documented
outcomes of resistance to new IT, then, are often confined to the boundaries of the organization because organizations and managers typically have the ability to respond to localized resistance by customizing the IT (e.g., Chou and Chang, 2008) or allowing the implementation to fail and replacing the IT (e.g., Barker and Frolick, 2003) (as depicted in Figure 1). Existing studies of digital infrastructure development tend to follow the same paradigm, perhaps because the studies examine infrastructure development in industries such as science. In such industries, organizations and the workers within them may have more flexibility and adaptability when confronted with IT problems.

However, under policy-driven IT implementations such as the EMR program, no such responses are possible; instead, workers must find ways to directly shape the policies governing IT selection and use. Social movement theory contains several concepts that might help to predict the types of resistance we might see when policies render localized resistance ineffective or impossible. In particular, researchers might begin paying attention to the opportunity structures available to certain groups of workers. In the case of the EMR program, caregivers exploited what social movement theorists refer to as political opportunity structures by leveraging the power of professional organizations such as the AMA to shape IT outcomes.

Political opportunity structures emerge when a particular group or groups in society perceive a sense of injustice (Kitschelt, 1986), have the leadership and organizational structures to mobilize (Eisinger, 1973; McAdam et al., 2003), and hold sufficient resources for affecting political change (Benford, 1999). The presence of these
factors provide the initial conditions for a social movement through which change is enacted (e.g., in the case of activism) and/or resisted (e.g., in the case of protest) (Thibodeaux, 2008). Caregivers faced with new IT under the EMR program perceived that EMR was adding time to their days and enabling unwanted managerial evaluation of their work, all for minimal benefit. This perception of injustice was left with no outlet within the organization. However, the AMA’s leadership recognized growing frustration nationally and mobilized resources to organize a movement aimed at shaping federal policies to ease the burden of EMR on caregivers.

IT certainly played a role in mobilizing caregivers against the federal EMR program. The Break the Red Tape and Physicians Grassroots Movement websites made the AMA’s hesitancies and criticisms about the EMR program clear and public, and eventually helped to contextualize the program within the broader political climate. Email forms for writing to Congress embedded on the websites enabled easy activism for individual caregivers and members of the public. But the AMA did not rely upon IT to mobilize or organize its efforts; instead, existing structures proved powerful enough for the movement to affect change. Internal communications such as newsletters and updates, formal avenues for political communication such as direct lines to government officials, and traditional organizing efforts such as town hall meetings shaped the outcomes of the program by directly stalling it, demonstrating the power of national resistance enabled by political opportunity structures.
Armed with a grounded understanding of how national resistance takes hold via the action of professional organizations, we might begin exploring how workers are responding to other policy-driven digital infrastructure implementations. However, the challenge is adapting concepts from social movement theory to frameworks that are more analytical and predictive than they are descriptive. In particular, social movement theory is useful for describing how movements accomplished (or failed to accomplish) a goal after the movement has achieved the outcome. One possible way to use social movement theory in predicting digital infrastructure development outcomes is to identify the political, institutional, or social avenues by which various groups of workers might resist digital infrastructure policies. The predominant models of resistance in the literature on IT implementations do exactly this, but as mentioned above, do so only within the boundaries of the organization. Markus’s (1983) model, for example, predicts implementation outcomes based on who favors or resists the new IT and the relative political power of these actors within the organization. If a power shift is implied by the IT implementation, those who stand to lose power resist it, with the degree of resistance directly influencing the realization of the implementation’s goals. The model suggests that resistance is enhanced or reduced by political tactics used during the design process and in implementation activities, such as identifying a champion for the IT to shift others’ perspectives.

Two selected concepts from social movement theory—relative deprivation and political opportunity structures—offer a way to transfer Markus’ (1983) model to large
implementation efforts such as digital infrastructure development programs. For example, when government agencies begin creating digital infrastructure initiatives such as the EMR program, we might evaluate the policies and predict which groups stand to perceive the program as a threat and whether or not that threat becomes a reality. By identifying groups that stand to be in a disadvantaged position relative to before the implementation (i.e., identifying groups likely to experience relative deprivation as defined by Meyer et al., 2004), we might know where to look for potential resistors in Phase 3 of implementation. After identifying the groups, we can then turn to examining the avenues they might have available to them to resist in Phase 4, using the opportunity structures available to that particular group of workers. For caregivers, professional organizations provided effective means by which to shape policy. For other groups of workers, including teachers, the opportunities may be similar. Still others, though, may demonstrate other forms of resistance because they lack direct lines of political communication that unions and other institutionalized groups may enjoy.

Opportunity structures might offer a way forward for assessing resistance to policy-driven digital infrastructure development. Kitschelt (1986: 58) defined opportunity structures as…

…specific configurations of resources, institutional arrangements and historical precedents for social mobilization, which facilitate the development of protest movements in some instances and constrain them in others. While they do not determine the course of social movements completely, careful comparisons among them can explain a good deal about the variations among social movements with similar demands in different settings, if other determinants are held constant.
In the case of the anti-EMR movement, the political influence of the AMA and other professional organizations empowered caregivers to resist. The absence of political influence might constrain other types of workers, such as retail workers, from launching national movements against IT such as automated cashiers and attendants, but simultaneously spur the exploitation of other opportunity structures, such as active engagement on social media.

To be sure, concepts from social movement theory remain amenable to localized accounts of resistance such as Lapointe and Rivard’s (2005) model, and exploring their applicability to this model helps to further expand the current conceptualization of resistance. The authors defined resistance as emerging over time in the following way: Subjects (workers and groups of workers) enter a new IT implementation under a set of initial conditions (individual perceptions, group influences, and organizational context) at Time 1. Once the organization implements the IT, subjects interact with each other and objects (system features) and inevitably perceive threats (about what the IT might stand to change). These threats can then be triggered by certain conditions (the actual consequences of IT use, events, system advocates’ reactions, other actors’ reactions) and generate resistance behaviors (misuse of the IT or speaking out against IT use). Responses to resistance behaviors—i.e., the changes that resistance sparks—then influence a new set of initial conditions and objects of resistance, and the process iterates toward Time 2. The idea of perceived threat to existing conditions is common to both Markus’s (1983) and Lapointe and Rivard’s (2005) predictive models of resistance and
aligns with the concept of relative deprivation. Markus (1983) demonstrated how politically powerful individuals and groups can shape IT outcomes in the face of these threats, while Lapointe and Rivard (2005) demonstrated how individual, group, and organizational level factors contribute to the emergence of resistance behaviors.

Scholars of technology and work have invoked social movement theory to understand situations in which new technologies enable movements, as opposed to examining how movements might oppose a new technology such as caregivers did via the AMA. For example, several authors across the organizational, information systems, communication, and sociology disciplines have explained the role of social media in organizing and executing modern protests. In studies of recent protest movements, including the Arab Spring and anti-corruption campaigns, researchers demonstrated how IT can be a valuable tool in building new opportunity structures for groups that may otherwise be too loosely-bound to effectively mobilize (Downing, 2000; Gerbaudo, 2012; Harlow, 2012; Lim, 2012; Shirky, 2011; Van De Donk et al., 2004). Examples such as these demonstrate that even though groups may not have existing opportunities to resist IT policies, it is possible for seemingly disconnected collectives of people to generate new structures for affecting change.

The actions of the AMA and its allies in the national resistance movement against EMR were largely reactive, rather than proactive, in resisting the program, at least in part because they could not predict the outcomes that EMR implementation might prompt. Nearly all of the caregivers at SWC had some exposure to EMR prior to the federal
mandate, but because EMR adoption and use was unregulated, negative experiences were not a cause for collective panic; caregivers could still influence the decisions of their organizations to ensure that EMR did not impede too forcefully upon their day-to-day activities. Once the federal government mandated EMR, though, caregivers swiftly lost local control and instead had to route resistance to the national level.

A focus on generating theories that account for national resistance does not imply that localized forms of resistance should be ignored or discounted. Rather, if we accept the assumption that changes to work begin at the individual level and “reverberate up levels of analysis” (Barley, 1986: 76), an inquiry into national and other forms of resistance necessitates that we begin by accounting for individual actions. Previous studies have thoroughly documented and explained these localized actions and how they relate to organizational outcomes of technology implementation (Davis, 1989; Joshi, 1991; Lapointe and Rivard, 2005; Marakas and Hornik, 2001; Markus, 1983; Nan, 2011). But the mechanisms by which workers recognize that localized resistance is insufficient or impossible, assess alternative resistance possibilities, and act to collectively resist a digital infrastructure development program remain understudied and deserve empirical and theoretical attention going forward.

The study presented above examined three research questions related to policy-driven digital infrastructure IT implementations. The first question asked how these types of implementations differ from traditional implementations. The case of EMR implementation in healthcare revealed that policy-driven IT implementations diminish
organizational choice in the IT adoption process and limit organizations’ ability to incorporate workers and a consideration of local realities into the adoption decision. Furthermore, strict policies render traditional conceptualizations of worker acceptance or rejection of the IT less relevant for evaluating the outcomes of implementation; workers must use the IT in prescribed ways.

The second research question asked what managers might do when faced with the inability to make adoption, implementation, and use decisions. My analysis showed that managers in the healthcare context employed panoptical features of the EMR in ways that enforced both local and federal policies for IT use. These compliance-gaining strategies proved effective for ensuring that caregivers used EMR appropriately, but the strategies also added to caregivers’ frustrations with EMR and the EMR program.

Answering the third research question, which asked how workers resist policy-driven IT implementations in the absence of local avenues, required looking to the national level. The AMA and other caregiver professional organizations launched a political movement against the EMR program, suggesting that workers might take alternative, non-organizational routes when resisting digital infrastructure programs.
Chapter 7: Conclusion: Limitations and Future Directions

The next several years may provide more cases in which federal policies aim to create, grow, and maintain digital infrastructures in some of society’s vital sectors. The findings from the study presented above are limited in several ways, which I discuss below. However, these limitations offer opportunities for future research aimed at expanding our understanding of how resistance might alter the trajectories of digital infrastructure development programs.

LIMITATIONS

The study above has several limitations. The first limitation relates to the case selection. The healthcare industry has several unique characteristics, including the diversity of private and public institutions’ influences on the IT decisions of the industry. The study presented above was conducted in a healthcare organization serving a high proportion of patients who were insured by public agencies relative to privately-insured patients, and thus the organization was required to participate in the federal EMR program. Private healthcare organizations are under no such pressure and therefore may experience different outcomes from those organizations who must comply with federal IT policies. We might expect similar scenarios to exist in sectors such as education, where private and public institutions may be subject to different IT policies and demonstrate different responses to implementation. A way of addressing this limitation would be to conduct a comparative study of public and private organizations and compare implementation outcomes, which might also help to distinguish between traditional forms
of resistance (i.e., resistance at the point of IT use) and elevated forms of resistance (i.e., collective, national resistance).

A second limitation concerns the length of the study. The study began well after the EMR policy was designed, signed into law, and rolled out. For this reason, the study includes only retrospective accounts of policy development and initial EMR implementation. Documenting the policy development process and the “go-live” period of implementation would aid in understanding how initial conceptions about the impact the policy might have translated into actual outcomes. Furthermore, it is difficult to draw conclusions about the role of various groups in the policy design process without observing and documenting the process itself. These limitations can be addressed by identifying policy initiatives that aim to transform industries via digital infrastructure development early in their development and tracing them over an extended period of time. Of course, a risk in that approach is that the policy under study may never achieve implementation; a benefit of my approach is that the policy was indeed in place.

Another limitation of my study is that the data that I collected and analyzed are insufficient for making generalizable claims about how much of the population of caregivers in the U.S. supported the AMA’s movement against the federal EMR program. It is possible that a select group of influential AMA leaders stood in opposition to the program and drove the effort to derail EMR implementation. However, the frustration observed at the healthcare organization I studied, the active participation of caregivers in town hall meetings and other anti-EMR efforts, and the number of professional
organizations who cosigned the AMA’s political communications stand as testament that support for the movement was widespread rather than confined to a small group of individuals. This suggestion could be empirically tested by surveying a sample of U.S. caregivers about their support of and participation in the AMA’s movement, which again would be most successful if conducted close to the timing of the movement’s actions.

Finally, as mentioned in Chapter 6, caregivers are a societally and politically powerful group of workers and thus may have the ability to shape digital infrastructure development in ways that other workers may not. Lapointe and Rivard (2005: 484), who developed the predominant IS model of resistance by studying doctors using the predecessors to EMR, concluded their study by noting that, “… caution is required in generalizing our findings. Because of the power physicians hold in hospitals, they are free to choose whether they use a given system than many other types of users.” The model has held true and contributed to other popular models of IT implementation and use (see Beaudry and Pinsonneault, 2005; Bhattacherjee and Hikmet, 2007; Burton-Jones and Gallivan, 2007), but the authors’ assertion about doctors’ choice in using the system has not. Yet we know that doctors remain a powerful profession societally and politically, and the above findings suggest that they may be exploiting those avenues to resist in the absence of the ability to resist locally. This type of agency may not be common to other workers. What is striking from my study is that even this powerful group of workers had no ability to resist locally, which speaks to the strength of the universal mandate of this policy-driven digital infrastructure.
**Future Directions**

Government and regulatory agencies continue to deploy policies aimed at creating, growing, and maintaining digital infrastructures in a variety of industries, particularly as computing capabilities including AI and Big Data analytics improve and make possible the analysis and use of the large amounts of data organizations collect every day. Some of these industries are similar to healthcare in that they are characterized by historically stable institutions, professions, and norms of practice. Education immediately comes to mind, but others—including policymaking, law, and law enforcement—are also undergoing times of technological change related to digital infrastructures. In future work, I hope to tease out the similarities and differences between how these institutions, professions, and norms of practice influence and are influenced by implementation of digital infrastructure technologies.

One of the primary challenges of studying policy-driven digital infrastructure development will be relating what we know from historical, sociotechnical studies of non-digital infrastructures such as highways (e.g., Seely, 1987), the electricity grid (e.g., Hughes, 1993), and public transportation networks (e.g., Carmien et al., 2005)) to digital infrastructures. Scholars of cyberinfrastructures and digital infrastructures (e.g., Borgman, 2009, 2010; Edwards et al., 2007; Star and Ruhleder, 1996) have begun this effort by pointing out the organizational, institutional, and social concerns associated with digital infrastructure development. Drawing mainly on studies of scientific and academic research infrastructures, these scholars demonstrated how the creation and
growth of infrastructures depends not only on the capability of the technologies, but also on the adaptation of new IT to existing work structures, professional norms, and institutional arrangements.

A fruitful extension of this work might be to begin focusing on what policy-driven digital infrastructure development means for occupations and professions and documenting what these collectives of workers do to respond to efforts to transform their work via new IT. As discussed above, we might begin developing types of opportunity structures that a set of workers might have available to them when faced with policy-driven IT implementations. Some collectives of workers, such as caregivers, might have political opportunity structures (e.g., politically-powerful professional organizations or unions), others might have social opportunity structures, and still others may seem to have no opportunity structures at all (e.g., retail workers). Workers likely have a mix of opportunity structures available to them and may exploit them in various combinations, or create new ones altogether. Studying development of digital infrastructures in various industries would help to identify different types of opportunity structures and how workers create and exploit them to resist IT when resistance at the point of IT use is rendered ineffective or impossible by strict policies.
Appendix A: The AMA’s Break the Red Tape Movement
The (Negative) Adoption Curve

Even though physicians welcome new technologies in their practice, a dramatic decrease in the percentage of physician participation shows the hurdles to meet Meaningful Use standards are just too high.

Stage 1: 54 percent of physicians participated for at least one reporting period/80 percent adopted EHRs

Stage 2: Physician participation in is less than 10 percent

Stage 3: The success of the MU program is in dire jeopardy without a shift in policy.

Break the Red Tape

Rushing the adoption of EHRs that don’t provide physicians with the support they need creates a costly burden and impractical expectations. It prevents physicians from providing the highest level of care for their patients. It’s time to rethink Stage 3 so health care professionals and EHR vendors can work together to improve products already in place and design the next generation of technology. The federal government must fix MU issues and make policy accommodate the differences in medical practices and new models of care.

Email Congress
Appendix B: The AMA’s Physicians Grassroots Movement

Physicians Grassroots Network

We're on a mission

The Physicians Grassroots Network connects physicians across the country and advocates for smart solutions to health care challenges.

We're raising your voice

We amplify your voice in Washington and influence legislation to benefit the patient-physician relationship.

Burdensome government red tape has stifled the quality of medicine for far too long, but physicians are finally making waves in Washington. That’s why we’re expanding our advocacy network to take on more than just regulatory red tape. Join the Physicians Grassroots Network to share your opinions on MACRA, opioid misuse, telemedicine, graduate medical education and more.
Electronic Health Records

Technology is a critical tool for improving patient-physician relationships. But current regulations on the use of electronic health record systems (EHRs) are short-sighted. Physicians must spend more time on computers than with patients, and prevent physicians from further investing in new equipment or technologies that will benefit patient care.
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