

Finding Value while Planning a Statewide Health Information Exchange

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Abstract

Implementing a statewide health information exchange (HIE) provides the opportunity to explore the application of IS planning methods to complex interorganizational systems (IOS). This study describes the HIE planning process followed by one state. The traditional planning steps recommended by the U.S. federal government did not compel project stakeholders to develop a sustainable business value proposition for the system. Unlike traditional project planning methods, planning a complex, relatively undefined IOS such as a health information exchange may require that IT professionals go beyond traditional planning activities and more actively facilitate definition of possible system value. In addition, the results show that technology should be considered earlier in the planning process, underscoring the need to anticipate the impact of IT architecture on the resulting system capabilities and value.

1. Introduction

The U.S. Health Information Technology for Economic and Clinical Health Act (HITECH) commits over \$20 billion in federal funds to automate health care practices and trigger development of networks for the electronic exchange of health care related information. The U.S. federal government expects this investment to potentially transform the delivery of health care in the U.S. by increasing both efficiency and quality [10].

A key goal of HITECH is to transmit health care data electronically from provider electronic health record (EHR) systems into a regional repository or networked access system that can eventually facilitate data collection and exchange in a Nationwide Health Information Network [5]. These health information exchanges (HIEs) are complex public-private inter-organizational systems (IOSs) with unprecedented stakeholder and data diversity, initiated through a state-level implementation process supported by significant public funding that is allocated over a short period of time [15].

Communities in the U.S. have been experimenting with the HIE concept for at least twenty years (prior to HITECH-funded HIE) [15]. Few detailed case studies examining implementation of these HIEs have been published, but the studies that have been published present mixed results. For example, one case study analyzed a failed HIE and attributed that failure to standard information technology implementation-related causes, such as ambiguous specifications and lack of management support [32], while another detailed the early success, and attributed the results primarily to significant state funding [23].

A comprehensive survey of HIEs in 2007 found a relatively high failure rate of pilot installations and substantial anxiety about the ongoing financial viability of HIEs [1]. The same survey repeated eighteen months later yielded similar results [2]. The number of regional HIE's had increased, but the failure rate remained high, and long-term financial sustainability was uncertain. Only about 40% were able to cover their operating costs from fees paid by entities participating in the exchange, and 28% did not ever expect to become fully self-supporting. While studies have shown that HIE can help reduce health care costs [4], limited acceptance by patients and providers, as well as difficulties defining a sustainable business model, bring the future of HIE into question [18].

The federal Office of the National Coordinator for Health Information Technology (ONC) created guidelines to steer the planning and initial implementation of HITECH-funded HIE. These guidelines are based on best practices in information systems (IS) operational project planning literature. This study reviews and analyzes that recommended planning process for one state. The overall goal of the study is to explore whether the recommended planning methods help stakeholders achieve their objectives during the HIE implementation process. Since one of the key issues from prior research is developing a financially sustainable statewide HIE,

our first objective is to observe methods that help stakeholders identify the business value for a HIE.

Existing research notes that the development of a statewide HIE requires an extraordinary level of participation among diverse stakeholders [3, 15], adding to the challenge of planning a complex IOS. The second objective of this study is to explore how knowledge is shared among information technology (IT) vendors and other project stakeholders in order to plan a sustainable statewide HIE.

2. Definition of an HIE

HIE focuses on the inter-organizational exchange of health care related data. An HIE is defined for this paper as the electronic transfer of health information among disparate, independent health-related organizations intended to improve patient safety, enhance clinical quality and efficiency, and better manage chronic disease conditions [33]. An HIE could be viewed as either a noun (a computer-technology based artifact to exchange data) or a verb (the exchange of data). This paper discusses the planning process for implementing an artifact that facilitates the exchange of health care data.

2.1. HIE Structural Overview

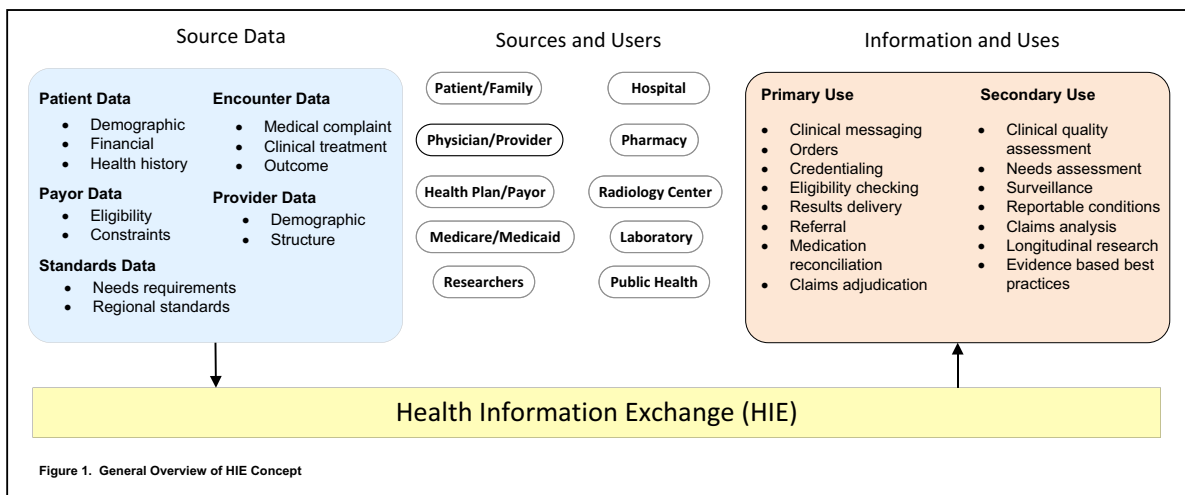
Figure 1 illustrates the HIE concept, showing the types of source data and information that could be generated from that data. Those who might generate or use the data are depicted in the middle of the diagram as the sources/users. As shown in Figure 1, the sources and users of the exchanged data are diverse. They could be affiliated organizations, such as health care providers who work for a particular hospital, or they could be competitors, such as two

hospitals located within a few miles of each other. Some posit that the diversity of stakeholders in HIE are unprecedented in technology application domains and that the differences in vocabulary, goals, needs, and use of the system require a completely different approach for stakeholder collaboration [35, 39].

The right side of Figure 1 shows that HIEs are expected to support both primary and secondary uses of the data exchanged. The “primary use” of HIE transmitted data is to support immediate health care decisions about patients. For example, HIE is promoted as a way to help health care providers cope with emergency situations when health care providers must determine quickly the current health status of someone in immediate need of care.

The “secondary use” of data supports research into population-based analysis of treatment patterns. Researchers hope to collate huge data sets from HIE in order to identify patterns of symptoms, disease, diagnosis, and treatment [5]. Government agencies expect to be able to assess the quality of care delivered by health care organizations by determining “best practices” in health care from the secondary use of data. They also anticipate having more comprehensive and accurate information to support public health decisions such as vaccination schedules and disease outbreak patterns [10].

HITECH-funded incentive payments are tied to the “meaningful use” of information exchanged by healthcare providers, as defined by the ONC, which is responsible for administering the HITECH grant funding. “Meaningful use” means that providers need to show that they are using technology in ways that can be measured in both quality and quantity. The current ONC criteria include both primary and secondary uses of information [6].



2.2. Physical HIE architecture

Designing a physical HIE architecture is left to the discretion of the participants. While HIE is drawn in Figure 1 as a bus, the actual implementation may take various forms. Three basic architectures define the range under consideration:

- **Centralized:** Data is collected from health care providers, integrated and stored in a central repository. There is also the possibility that an external organization could store the data in a “bank” account (termed a health record bank) that is then “owned” by the patient [17].
- **Peer-to-peer (federated):** Data is stored with each individual health care provider, but the HIE contains a master patient/provider index referenced when queries for data are performed.
- **Hybrid:** A central repository contains core data (as defined by the given HIE) but detailed data is stored by the individual health care provider.

It is also likely that multiple HIEs will be installed in a single state, each with a potentially different architecture, but with defined methods of interrelating each individual exchange.

Originally, the architecture range was based on the idea that health data from diverse providers would be collected into a comprehensive, detailed view of each individual person. A complete medical history of that person could be made available, either through a central repository or online query collection of data. The collection would ultimately be available through a National Health Information Network [5]. The ONC has recently changed the architectural focus of HIE from a repository to a point-to-point connection [27]. Regardless of architecture, there are a number of technical issues that must be solved for an electronic exchange to work including: Identifying patient records without a consistent universal patient identifier; developing complete and comprehensive interoperability standards; creating data from provider notes that will have little meaning to other providers; developing data aggregation techniques; and creating effective privacy protection methods[12].

In summary, a HIE is a complex IOS requiring the participation of diverse stakeholders that serve as the sources and users of data exchanged within the system. The physical HIE architecture is relatively undefined and there are many currently unsolved technical issues. While area wide inter-organizational

electronic exchange of health information is not a new concept, there are relatively few viable exchanges functioning in the U.S. and there is no clear reason for the success or failure of a given exchange. Nonetheless, the U.S. federal government is investing significant resources in these systems with the hope of transforming health care practices. The next section reviews the ONC implementation guidelines in light of the IS strategic and operational planning literature to provide background for this study.

3. Project planning for IOS

The continuum of IS planning stretches from strategic information systems planning (SISP) exploring how technology based systems are conceived and valued within an organization or group of organizations [38] to detailed operational project planning that specifies the activities and the order in which they should be accomplished to complete a defined project scope [11]. Much of the operational project planning research has been distilled and incorporated into the project management common body of knowledge referred to as PMBOK [37].

It is possible to argue that the implementation of statewide HIE is an exercise in operational project planning because HITECH already identified the goals of the project, established the timeframe, determined the budget, provided guidelines, and framed the required deliverables. These characteristics fit with PMBOK [11] and HIE project planning could be understood by evaluating how HITECH recommendations align with that work. On the other hand, HITECH provides only initial funding for HIE and does not intend to support ongoing operations. A task within the ONC planning process is to identify a viable value proposition and business model to sustain the system; SISP provides more insight than PMBOK into how organizations determine the potential value of an information system. Thus, the following sections incorporate literature from both SISP and PMBOK as applied to an IOS to provide background for our study.

3.1. Importance of defining value for IOS

Planning the implementation of a system, such as HIE, among widely disparate and potentially competitive organizations requires more understanding of the goals of each participating organization and the value that the system will provide than in intra-organizational planning [22].

The potential value of an IOS is typically stated in terms of saving time and/or money [36] by restructuring or standardizing an organization, reducing transaction costs, and/or enhancing productivity [29]. Other possible values of an IOS stem from increasing revenue through expanding the share of an existing market or identifying new markets [36], or enhancing the quality of new or existing products and/or services. On a more fundamental level, an IOS will produce these benefits by impacting participant interactions [8] creating new types of data [24, 28], or improving processes [26]. Recent literature highlights the need to expand analysis beyond cost savings, to encompass potential intangible impacts of inter-organizational collaboration such as new relationships and collaboration methods [8].

Few studies provide empirical evidence of methods that help differing organizations collaborate to explicate individual goals. One study described IOS planning practices and determined that the methods used were not effective because they focused on systems issues rather than attempting to define goals and highlight cooperation issues [13]. A second study emphasized the importance of focusing on “spheres of influence” rather than technology or structures [14]. Another study emphasizes the need for shared governance and enhanced collaboration between IT and domain executives to define value for IOS [41], but there is little empirical research of the actual planning process to show how each area in separate organizations collaborates to find value within an IOS project.

Research in IOS planning on a strategic level highlights the importance of developing a clear value proposition [7, 29], and gives many examples of potential value, but does not clearly address methods of teasing out that value for a given project in situations without a dominant partner [16].

3.2. A process to plan the HIE IOS

In alignment with PMBOK guidelines, The ONC requires that a strategic and operational plan be prepared by each state and approved by ONC prior to release of HITECH implementation funds. The HIE planning process is a linear set of steps composed of four stages, each containing multiple possible steps [21]. The stages are a non-iterative waterfall including: (1) formation, (2) design, (3) implementation, and (4) evaluation. In the first stage of formation, the states are to develop the goals of the HIE (tasks 1 and 2 below). The federal government

recommends that the following tasks should occur during the entire formation stage, in the order provided below [21]:

1. Develop governance model and legal entity;
2. Develop business model (initial funding sources, ongoing funding sources, return on investment analysis, and organizational structure);
3. Identify the clinical data-sharing model;
4. Define the access and authentication model;
5. Design overall technical model.

It is notable that the last activity in the formation stage is the design of the technical model. The assumption for the HIE planning process from ONC is that the value of the system can be determined separately from the technical architecture of the system. By placing that activity at the end of the formation stage, project participants could assume that the value derived from the system is not dependent on the possible technical models.

3.3. Stakeholder participation in the process

The ONC mandates an inclusive process that requires consultation with a wide variety of potential stakeholders including health care providers and their support staff, representatives of health plans, patients or consumer organizations that represent the population, health technology vendors, health care purchasers (such as employers), public health agencies, health professional schools, clinical researchers, and any other groups that are particularly relevant for a given state.

IS literature is rife with recommendations for participation in systems implementation [30, 31], but the assumption of much of the literature is that the leader of the project is an IS professional, and that the “participants” are the intended users of the system. The vast majority of the literature related to participation in project management teams discusses the effects of “user participation” on project outcomes with a meta-analysis determining that user participation is moderately beneficial for productivity outcomes and comparatively stronger for attitudinal/behavioral outcomes [19].

Stakeholders participating in the implementation of an IOS are more diverse than those in an intra-organizational system [7]. These participants must be identified and project success may depend on understanding their individual and inter-related involvement in the project [7]. The extent to which knowledge is shared between stakeholders who are

IT and domain experts has been shown to be a key antecedent of project success [20]. Research also highlights the importance of trust and shared rewards for sharing knowledge between internal stakeholders and external consultants [25]. Current research emphasizes that perceived goal, task and reward interdependencies are critical for knowledge sharing among stakeholders [34].

In the case of HIE implementation, it is more likely that the project manager will be a government employee with health-care related background and that some of the “participants” will be IT professionals from technology vendors. Reviewing the stakeholder requirements from the ONC, it is possible that there will be fewer stakeholders with IT expertise than is seen on other IOS projects. Thus, successful HIE project planning will depend on the ability of the project manager to absorb and use the information provided by vendors. There is remarkably little research exploring the issues of knowledge sharing among IT vendors and non-IT personnel.

3.4. Study objectives

In summary, existing research emphasizes the need to determine value for IOS prior to implementation and the ONC guidelines for the HIE project puts that task high within the planning process guidelines. However, there are few suggestions in the IOS literature for methods to determine that value and the ONC does not provide any either. Our first objective is to observe methods that help stakeholders identify the business value for a HIE.

Much research on stakeholder participation assumes that the project manager for a technology related project has knowledge of technology, while the participants are the intended users of the system and may not have strong expertise in technology. This study explores how knowledge is shared not only when the reverse is true, but when those providing technology expertise are vendors. The second objective of this study is to explore how knowledge is shared among vendors and other project stakeholders.

4. Research Method

A qualitative case methodology is appropriate for this study because the research requires examination of an actual planning process within its natural context [9, 40]. The study questions require that we examine in depth a single planning process to

understand what methods are used for knowledge sharing and communication, as well as observe the effects and modifications of the planning process.

This is a single case study design examining in depth the initial HIE planning process in the State of Nevada. The unit of analysis is the planning process within a state. This case covers the time period from the initial charge by the federal government to the state to plan an HIE initiative, until the plan was submitted for review to the ONC.

Over a twenty-two month time period during 2009-2012, multiple forms of data collection were used to explore the planning process. Singly and collectively, the researchers attended 42 different meetings and interviewed both process stakeholders and technology vendors. In addition, we collected and read published written meeting minutes, planning documents, our individual meeting notes, and the published videos of the meetings. Analysis was performed concurrently with the data collection process, but the final analysis occurred after the HIE plan was accepted by the ONC.

5. Background about the case

Nevada is a good observation post to study the planning and development of a statewide HIE because health care providers and government entities are in the early stages of incorporating HIT into the health care system, allowing the planning process to be viewed in its entirety. In addition, the state contains two major urban areas encompassing health care facilities comparable to other large urban centers in the U.S. The state also has a significant rural geographic area allowing the research to incorporate both rural and urban health care facilities.

5.1. Key factors about Nevada

Nevada is the seventh-largest state with approximately 85% of the state land owned and controlled by the federal government. Approximately 60% of the state’s 2.7 million people (2009 certification by Nevada State Demographer) live in the southern urban area, while 30% live in the northern urban area, and 10% live in the rural counties.

Nevada was particularly hard-hit by the economic downturn. As of early 2013, the state continues having the highest home foreclosure rate, has over 9.5% unemployment, and the state budget is facing the largest percentage deficit when compared to other

states. The State's position has been unequivocal: HIE must be self-supporting in Nevada because there are no funds available to support it.

5.2. Key factors about state health care

The points below present information about the health care system and level of automation employed:

- **Healthcare sector includes comprehensive set of types of providers and payers:** In addition to the private sector providers, the Nevada healthcare industry includes two Federally-qualified Health Centers with over 25 clinic sites, 15 tribal health centers/clinics, two Veterans Administration (VA) hospitals, and eleven community-based VA outpatient clinics.
- **Relatively small quantity of key stakeholders:** Healthcare providers that could exchange information include 56 hospitals and 5,400 professionals. Approximately six large payers account for the majority of the insured population, largely because 19 payers collaborate as members of the Health Services Coalition. Approximately 10% of the state's population is enrolled in Nevada Medicaid and 13% in Medicare. The combination of a comprehensive set, yet relatively small quantity, of stakeholders makes it possible to study diverse groups more readily in Nevada.
- **Health care workforce:** Nevada has a relative physician/provider shortage: approximately 85% of the state has been designated as Health Professional Shortage Areas for Primary Care by the federal government.
- **HIT penetration:** A 2010 survey¹ indicated that approximately 46% of health care providers have some form of EHR system, while an additional 32% plan to implement an EHR system within the next five years. In Nevada, the dominant use of EHR is for clinical documentation and notes (93%). Only 28% of EHR users use clinical decision support applications. Large providers focus on exchanging information "within" their contractual organizational structures rather than across organizational boundaries.
- **HIE applications:** Approximately 20% of respondents in the 2010 survey engage in e-prescribing, but only 61% of those send prescriptions electronically. In that same survey, about 64% sent claims/billing information electronically, while only 9% report sending

information electronically to public agencies.

- **HIE Implementation:** The state does not currently have any HIEs exchanging data among disparate organizations.

5.3. HIE planning timeframe

Nevada developed a phase one planning structure during spring and summer 2009, submitted the HITECH grant application in fall 2009 and used funds from the resulting state-federal cooperative agreement to fund the structure for the second phase of planning beginning February 2010. The required State HIT Strategic and Operational Plan (State HIT Plan) was submitted to ONC late January 2011 and approved in May 2011. The Nevada Health Information Exchange (NV-HIE) non-profit corporation was established in September 2012 as the designated governing entity for the statewide HIE. This case focuses on the planning process up through the establishment of the NV-HIE.

6. HIE planning in Nevada

In Fall 2009, the Nevada State Department of Health and Human Services (DHHS) hired a state HIT Coordinator and the Governor established the Nevada HIT Blue Ribbon Task Force (Task Force) to assist with the planning process.

6.1. Planning task force

To meet the intent of HITECH requirements, the Governor appointed a diverse group of 20 key stakeholders, which included representatives from Nevada Medicaid, health care systems and providers, public health agencies, the State Division of Insurance, payers and employers, the Nevada System of Higher Education, pharmacists, medical records, the State Attorney General's Office, and consumers. The Task Force was charged to complete the conceptual discussion and planning needed to support the development and submission of the State HIT Plan for ONC approval, including these tasks:

- Recommending policy and legislative actions;
- Encouraging coordinated and collaborative efforts with the private health sector;
- Maximizing public and private partnerships for the development of a sustainable statewide HIE infrastructure; and
- Providing a transparent forum for reviewing and discussing HIT and HIE issues, and suggesting potential solutions for those issues.

¹ Nevada HIT Statewide Assessment: This was a federally-required environmental scan completed by the Nevada Department of Health and Human Services, 2010.

The Task Force organized subcommittees to facilitate planning and decision making, and to incorporate additional stakeholders. These subcommittees addressed: (1) technical infrastructure, (2) governance and accountability, (3) financial viability and sustainability, (4) EHR adoption and meaningful use, and (5) privacy, security, and patient consent. Including subcommittee members, total committee membership included 38 stakeholder participants. From October 2009 through January 2011, the Task Force met almost monthly to discuss issues and make recommendations. By Executive Order, the Task Force concluded its work on June 30, 2011 after producing a general report for the Governor.

6.2. Data gathering for task force

The State HIE Cooperative Agreement required that an environmental scan be completed. A three-pronged approach was employed: (1) qualitative interviews with 32 Nevada HIT stakeholders; (2) ten focus groups meetings with approximately 80 Nevada stakeholders; and (3) an online survey (364 responses) to solicit feedback about the adoption of EHR from Nevada health care providers.

The HIE Cooperative Agreement required that a regulatory and policy inventory be done to identify barriers and gaps that might impede the adoption of EHRs and the implementation of HIE. The results were provided to the Task Force.

Since HIE is a relatively new concept in Nevada and few people in the state are knowledgeable about the structure or architecture, Nevada's HIT coordinator spent much time learning about such systems. Nevada's HIT Coordinator served as the project manager and met with HIT vendors to learn more about available technical architectures and possible solutions for HIE. HIT vendors served as the primary expertise provider for technology-related information.

Vendors advocated an array of existing products that might be applicable to HIE and discussed custom solutions that could be appropriate for the state. IT vendors emphasized the relative benefits of particular architectures and products rather than discussing who might gain value from the exchange. For example, vendors did not provide information about the cost implications of building an exchange to support primary vs. secondary uses of data, or the marginal costs of adding functionalities to a basic system. Instead, each vendor highlighted and emphasized the

benefits of their particular system and their specific architecture. In addition to meeting with vendors, the State HIT Coordinator attended relevant conferences, discussed options with other state coordinators, and learned about existing HIEs.

6.3. HIE Plan writing and completion

The process thus far was to produce a planning document required for submission to ONC. A consulting company, with experience in HIE plan development and deployment, was contracted in November 2010 to assist the State HIT Coordinator in developing Nevada's State HIT Plan for submission to ONC, based on the results of the task force recommendation. The company's scope of work included completion of a State Plan acceptable to ONC.

6.4. Outcomes of the HIE planning process

The first stage of Nevada's HIE planning process yielded two deliverables: A legislative bill draft submitted to the Nevada Legislature and the State HIT Plan submitted to ONC. The Nevada plan has ambitious goals that align with HITECH requirements: enable care delivery innovations, improve health care quality and outcomes, improve access to care services, improve patient safety, enhance public health, control the cost of health care, and reduce health disparities.

The plan also articulates a set of "strategic tenets" to guide implementation of HIE in Nevada, including: HIE will be delivered by a financially sustainable organization that is financially independent of federal and state funding and the governance structure will facilitate representation of a wide group of diverse stakeholders who will consider both current and future health needs within the state. The plan includes two types of statements about the value proposition: Nevada will focus on a consumer/patient-centered approach that will generate value for consumers/patients, and the consumer/patient value issues will be addressed in phase II.

7. Discussion and analysis

While the plan submitted by Nevada complies with ONC requirements and was accepted for further funding, the planning process did not identify a financially viable value proposition or business model for the state. The overall goals for Nevada's HIE mirror those provided by the ONC; the required

planning process did not establish targeted goals for Nevada's participants.

This issue may be problematic because of the experiences of other exchanges attempting to achieve financial sustainability [2] and because one of the key tenets of Nevada's plan is to develop an exchange that is financially independent of governmental support.

7.1. Methods to identify value proposition

A subcommittee was created and charged with identifying value propositions and business models. The committee met multiple times and there was much discussion about whether the goals should be broad or narrow. There were many assertions that were not supported by empirical evidence such as:

- "Three groups of individuals will be willing to pay for Health Record Bank services: parents who need immunization records for their children, adults caring for aging parents, and individuals managing chronic conditions." (Vendor of HIE Solution)
- "HIE will support Medicaid fraud detection," and "Medicaid fraud detection yields cost savings" (State HHS employee)
- "Employers, etc. can get value from prevention services" (Task Force Member)
- "Research queries will constitute a future revenue source" (Task Force Member)

The subcommittee decided that it wasn't possible to determine the value of HIE until it was built.

7.2. Reasons that value proposition was not determined

The next sub-sections discuss the factors that contributed to the difficulty in defining a value proposition and business model for HIE.

7.2.1. Quantity and diversity of stakeholders As noted in prior literature [19], participation from diverse stakeholders has both benefits and drawbacks to the development of a system. Inclusion of diverse stakeholders made it difficult to focus on a targeted value proposition. For example, state and local health agencies use data for registries, disease surveillance, and disaster preparedness. Researchers analyze this type of data to monitor compliance, analyze quality, understand variations in practice patterns, and identify best practices. HIE is expected to dramatically increase the richness of the data available to support these types of research. However, the value proposition for this activity is not clear. This secondary use of data could be considered

a public good, but the entities supplying the data will not benefit directly and it is not expected that government health agencies will pay for the data.

Stakeholders who believe there is a financial value from IOS, such as large health care or insurance providers, are already doing it within their own organizations and may not be interested in more comprehensive exchange of data. These entities have invested substantial resources to gain competitive advantage, and may not be interested in supporting additional infrastructure so that others can perform similar analysis. Thus, they are less willing to collaborate within the planning process.

7.2.2. Role of IT professionals. Multiple IT professionals participated in the HIE planning process in differing roles: as stakeholders, as advisors, and as potential vendors providing HIE solutions. None of the IT professionals were able to help the other stakeholders understand the key issues essential for specifying a sustainable value proposition; the IT professionals approached HIE as a mandated technological solution and focused on methods of implementation. Vendors implied that the technology solution was independent of the actual value proposition for the system.

Knowledge sharing between potential vendors and the HIE Project Director was incomplete. The IT vendors focused on physical HIE architecture, while the Project Director emphasized development of system goals. Contrary to current literature [13], we found that the structure of technology impacted the potential value of the system and discussions of the physical HIE architecture should have occurred along with discussions of system value. For example, the point-to-point architecture will satisfy the requirements for primary use of data, but will not provide easy access to data for aggregation and secondary use. While the literature recommends focusing on collaboration rather than technology [13], HIE planning highlights the importance of considering both simultaneously.

7.2.3. Pre-defined result. Stakeholders in the process were not compelled to identify a functional value proposition for the system because the federal government had already specified that the exchange of electronic health records would be implemented. There was no compelling reason for stakeholders to define value prior to implementation of the system, so they didn't. The process recommendation by ONC focused on the management of planning as a project, rather than a strategic effort. By combining facets of SISP and PMBOK into a single planning process, the stakeholders felt free to complete a plan

that didn't include the critical component of a value proposition.

8. Implications for research and practice

The planning and implementation of HIEs offers IS researchers and practitioners a unique opportunity to explore the development of complex IOSs. This study looked at only one state, so it is limited in its ability to generalize the conclusions to other states. In addition, HIE implementation is relatively new within the state so this case may present a view that is less advanced than states with more experience with these types of IOS's. However, the results do provide insight for both practitioners attempting to implement a complex IOS, and for researchers studying information systems within the health care domain.

This case provides three insights for IT practitioners and researchers to better understand how to plan these IOSs. First, while stakeholder participation is important to the planning process, it may be necessary to develop guidelines prior to the start of the process concerning the role and expected results from the stakeholders. While this approach might constrain the participation level, it could help encourage more structure in the planning effort. Second, knowledge sharing among stakeholders who have differing backgrounds and vocabulary is difficult in most application domains but may be even more problematic in health care. IS research within the health care domain might be served by creating a more granular and specific categorization of stakeholders to understand their differing needs. As it may be effective to categorize health care users in more detail, researchers could also differentiate between using external vs. internal consultants for IT expertise because of differing expectations and understanding of issues from the two groups of IT professionals. New models are necessary to address knowledge sharing between non-IT personnel and IT vendors (vs. internal IT personnel). Finally, the development of a value proposition and business model is crucial to the success of an IOS. In the case of HIE, the government mandate eliminated a sense of urgency to define this critical component of an IS plan. Many IOSs have a dominant partner with an explicit, financially beneficial reason to implement interorganizational exchange of data. Since statewide HIE does not have that partner, a more strategic approach to planning, rather than an operational approach, should be employed to ensure development of value for the system.

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