Toward Systematic Identification of Stakeholders for Healthcare Information Systems: A Feature-Based Method

Research-in-Progress

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ABSTRACT
Healthcare Information Systems (HIS) are considered as a critical component for the operation of healthcare organizations. Successful adoption and diffusion of these systems require involvement and cooperation from stakeholders across different departments and business units. However, it is quite challenging to identify stakeholders in environments where inter-organizational structure is very complex involving various groups and sub-groups who, most often, have diverse and conflicting interests and views. Thus, identifying all relevant stakeholders is a critical and challenging task. Although stakeholder research has been around for well over two decades, few studies provide a systematic method for identifying stakeholders for specific information systems. Thus, there is a greater need for further research in this area. In this paper, we propose a new approach, a Feature-Based method, to identify relevant stakeholders for information systems in healthcare.

Keywords (Required)
Healthcare, Stakeholders, Stakeholders Identification, Healthcare Information Systems (HIS), Feature-Based Model

INTRODUCTION
With the rapid technological advancements in recent years, various Information Systems (IS) are widely accepted as a key factor for successful operation of healthcare organizations. Today, hospitals and clinics profoundly rely on HIS for reducing medical errors, lowering costs, and improving quality of care in order to meet national standards. However, despite these benefits, the adoption of various HIS such as computerized physician order entry (CPOE) system, enterprise application integration (EAI) system, electronic health/medical record (EHR/EMR) systems, and electronic prescribing (ePrescribing) systems by hospitals and healthcare providers are far less than expected (Bhattacherjee and Hikmet, 2007; Ford, Menachemi, and Phillips, 2006; Hsiao, Hing, Socey, and Cai, 2010). Many of these technological initiatives in the healthcare sector failed due to the complexities of the projects created by the unique nature involving human lives and diverse stakeholder groups, often with different backgrounds and interests. In most cases, researchers and practitioners fail to adequately address the needs, expectations, trainings, cultural issues, and, most importantly, perceptions of all stakeholders associated with these systems (Murray and Pollard, 2004). Although previous researchers have investigated the factors behind various HIS adoption failures, many of their findings point to one common cause – resistance to adopt new systems by their stakeholders. Therefore, it is imperative that all relevant stakeholders are identified as their roles play significant factors for the successful adoption of health information systems. However, identifying all stakeholders in such a complex environment is a challenging and intricate task.

Several previous studies (Lyytinen, 1988; Lyytinen and Hirschheim, 1987; Mitchell, Agle, and Wood, 1997; Pouloudi, 1998; Pouloudi and Whitley, 1997; Vos and Achterkamp, 2006; Wolfe and Putler, 2002) have attempted to develop methods to identify stakeholders. However, some of these methods are classification of stakeholders rather than methods to identify them (Mitchell et al., 1997; Vos and Achterkamp, 2006; Wolfe and Putler, 2002). Others are categories of stakeholders which are too generic for the given context or provide too simplistic a view for understanding their impact on the HIS adoptions (Lyytinen, 1988; Lyytinen and Hirschheim, 1987; Pouloudi, 1998; Pouloudi, 1999). In this paper, we develop a new Feature-Based method to systematically identify relevant stakeholders, based on the functionalities provided by HIS. Since healthcare information systems are designed for inter-organizational environment, which is very complex by nature, our proposed method uses a top-down approach. It breaks these complex systems into their functionalities and identifies interested parties.
for each functional feature to generate a complete list of relevant stakeholders, which is considered a more systematic approach than before.

The remainder of this paper is organized as follows. In the next section, we provide literature review of stakeholders in the context of non-IS, IS, and healthcare IS. We then discuss the existing methods for identifying stakeholders. In the following section, we propose a Feature-Based method, a new approach for systematically identifying stakeholders for HIS. In the discussion section, we present the theoretical implications of the proposed method. We conclude with a discussion including limitations of our study and directions for future research.

EXISTING STAKEHOLDER RESEARCH

Since introduction of the stakeholder concept in the field of Management (Freeman, 1984), the importance of stakeholders and their impact in organization have been the focus of study by researchers across different discipline such as management, organizational, operational, economic, healthcare, and, not to mention, information systems. Thus, we provide a brief review of previous research on stakeholders in the field of non-IS, IS, and Healthcare IS.

Stakeholders in Non-IS Research

Early studies on stakeholders can be found primarily in the management and organizational literature. In 1984, Freeman defined the stakeholder concept from organization perspective and established basic characteristics of stakeholder. A later study (Hill and Jones, 1992) used stakeholder theory to explain organization’s strategic behavior and management structure. They identified stakeholders from organization perspective such as managers, employees, customers, suppliers, creditors, local communities, general public, and stockholders. Another study (Wallace, 1995) grouped stakeholders into seven basic categories including government, shareholders, executive management, customers, employees, suppliers, and community. They investigated the impact of conflicting stakeholders’ requirements and importance of balancing them in order for efficient and effective decision making. Similar to Wallace’s study, Wong (2005) also investigated the impact of stakeholders’ conflicts on projects and found that significant differences between stakeholders lead to serious issues, such as poor communication, misunderstanding, conflicts, and ultimate project failure.

Donaldson and Preston (1995) argued that there are four aspects revolving stakeholder theory namely 1) descriptive, 2) instrumental, 3) normative, and 4) managerial. They argued that the first three aspects of the stakeholder theory are nested within each other, which describe, predict, and explains. However, managerial aspect is used in the sense that it not only simply describes or predicts but also recommends the attitudes, structures, and practices for the organization. Another study (Mitchell et al., 1997) presented the stakeholder theory to define the concept and to identify different types of stakeholders. They used three relationship attributes: power, legitimacy, and urgency in order to generate a typology of stakeholders. In their study, they grouped stakeholders as primary/secondary, as owners/non-owners, as actors or those acted upon, as voluntary/involuntary, as rights-holders/contractors/moral claimants, as resource providers/dependents, as risk-takers/influencers, and as legal principals.

Stakeholders in IS Research

A large number of studies explored the role played by stakeholders on the success or failure of IS development, adoption, implementation, and diffusion in organizations. Although many of the past researchers cited costs and complexities are the major factors for IS success or failure, some of the recent studies identified that stakeholders are not only viewed as a major factor but, in many cases, also a key attribute to the success or failure of technology implementation. Scholl (2004) explored the importance of involving salient stakeholders in business process change projects and developed a framework that provided a logical guide for identification of salient stakeholders and addressing their needs. Another study (Lacity and Hirschheim, 1995) also emphasized the importance of stakeholders’ roles for IS strategies, and presented a framework that can help understand stakeholders’ expectations and perceptions toward IS. Pouloudi (1999) considered the use of stakeholder concept from various perspectives such as descriptive, instrumental, and normative in IS literature and then compared it with the current concerns in the strategic management literature. The author reviewed different approaches of stakeholder concept and argued for a more thorough understanding of the stakeholder concept as IS development has become more complex. She identified systems developers, information suppliers, and different user groups as key stakeholders for a typical Information System and also specified a number of principles of stakeholder behavior that can be used to identify and analyze different stakeholders.
Stakeholders in Healthcare IS Research

Healthcare environments such as hospitals, clinics, emergency rooms, and laboratories are much different from the non-healthcare environments and the stakeholders for HIS also vary considerably. Therefore, concepts of stakeholders, which originated and used in the non-healthcare environment may not be directly applicable in healthcare settings (McLeod Jr and Clark, 2009). In order to identify individual roles for stakeholders, McLeod and Clark (2009) presented a simplified stakeholder analysis method. The authors identified patients, physicians, specialists, interns, residents, nurses, clinicians, and administrators as the key stakeholders for healthcare products. Shah and Robinson (2006) conducted a study to understand the impact of stakeholders’ involvement in healthcare technology development. They identified a number of different users such as physicist, physicians, medical record personnel, IS personnel, clinicians, equipment maintenance personnel, therapists, nurses, medical students, patients, carers, specialists, technicians, and laboratory personnel. De Zegher, Venot, Milstein, Séné, De Carolis and Pizzutilo (1994) identified a series of stakeholders for a drug prescribing system and found that patients, prescribers, care providers, managers, and pharmacists are the key stakeholders. Although these stakeholders are very context specific, the authors did not provide any rationale for identifying these actors as key stakeholders. Similar to this study (de Zegher et al., 1994), several other studies (Hill and Jones, 1992; Savage, Blair, Benson, and Hale, 1992; Wallace, 1995) identified very broad groups of individuals as stakeholders including managers, stockholders, employees, customers, suppliers, creditors, and communities without rationalizing their selection of these groups as major stakeholders. A more recent study (Mantzana, Themistocleous, Irani, and Morabito, 2007) proposed four groups of stakeholders – (a) Acceptors, (b) Providers, (c) Supporters, and (d) Controllers. Even though none of these studies provided a systematic approach to identify their stakeholders, all of these researchers recognized the importance of proper identification of all stakeholders in order for successful implementation, diffusion, and management of IS.

EXISTING METHODS FOR IDENTIFYING STAKEHOLDERS

Although importance of proper identification of all stakeholders is well supported by research community, only a few researchers actually took the initiative to understand the difficulties and issues involved in the systematic identification process. Several researchers (Benjamin and Levinson, 1993; Lyytinen and Hirschheim, 1987; Mantzana et al., 2007; Pouloudi, 1998; Pouloudi, 1999; Vos and Achterkamp, 2006) have explored the stakeholder identification issue and proposed a number of different procedures for stakeholder analysis. Axelsson and Easton (1992) stated that “to identify who the actors are in certain situation is one of the primary issues” (p 195). McLeod and Clark (2009) acknowledged this fact in their research and stated that “hospitals, emergency rooms, and laboratories are very different from the normal business environment, and healthcare stakeholders vary considerably in the role they play”. Thus, the methods and processes used for identification of stakeholders in a casual business environment are not adequate and may not be applicable in healthcare settings where organizational structure and interactions among its stakeholders are very complex.

Two early studies (Lyytinen, 1988; Lyytinen and Hirschheim, 1987) suggested five criteria for stakeholder identification. They are (1) the nature or views of information systems such as symbolic, communicative, organizational, and technological dimensions; (2) the type of relationship of the stakeholder to the IS such as producers, consumers, and users; (3) the direct or indirect ‘depth of impact’; (4) the level of aggregation which may vary between individual, groups, or larger collectives; and (5) external (legislators, vendors, and other clients) vs. internal (such as end-users, managers, and systems analysts) groups. Later studies (Pouloudi, 1998; Pouloudi and Whitley, 1997) brought together ideas from the network concept in organization management and the stakeholder analysis approaches to suggest a comprehensive approach to stakeholder identification. Instead of creating a single stakeholder map, they defined four principles that characterize the behavior of stakeholders – (1) stakeholders depend on the specific context and time frame; (2) stakeholders cannot be viewed in isolation; (3) the position of each stakeholder may change over time; (4) feasible options may differ from the stakeholders’ wishes. In addition, Pouloudi and Whitley (1997) implemented a three-stage approach to identify stakeholders. Their three-stage approach can be further extended to n-stage by analyzing the responses and identifying new stakeholders in every stage. In a more recent study, Mantzana et al. (2007) implemented a mix method for stakeholders identification. Using dimensions proposed by Lyytinen & Hirschheim (1987) and the principles introduced by Pouloudi & Whitley (1997) along with their proposed static categories of healthcare actors (Acceptors, Providers, Supporters, and Controllers’), they combined the dynamic and static approaches and developed the IGOHcaps method to derive a complete and representative list of healthcare actors.

Most of these studies produce a generic stakeholders lists that are not appropriate for all contexts and many cases fail to identify all relevant information systems stakeholders (Pouloudi and Whitley, 1997). For example, Lyytinen and Hirschheim’s (1987) study provides too simplistic views for identifying stakeholders, the study by Freeman (1984) suggests too generic stakeholder groups, which is not appropriate for all contexts, Pouloudi and Whitley’s (1997) principles describe
the behavior of stakeholders and their roles rather than identifying the stakeholders, Vos and Achterkamp’s (2006) four-step method targeted for innovative projects or projects with similar characteristics, and most other studies do not provide any practical guidelines toward stakeholder identification. One of the best stakeholder identification method we have encountered to date is the mix method implemented by Mantzana et al. (2007). Although their method combines static and dynamic approaches, the four static groups (Acceptor, Provider, Supporter, and Controller) of stakeholders may not be appropriate for all context specific systems. Therefore, a useful, effective, and systematic identification process that fits specific contexts is missing and further study is still needed to fill this gap for identifying relevant stakeholders for IS in the healthcare industry.

A PROPOSED FEATURE-BASED METHOD FOR IDENTIFYING STAKEHOLDERS

Since information systems that are designed for inter-organizational environment are typically very complex, it is difficult to clearly identify the relevant stakeholders who have real interests in those systems. Therefore, we propose a top-down approach that breaks complex systems into their functionalities. The instrumental aspect of stakeholder theory (Donaldson and Preston, 1995) stated that “stakeholders are identified by their interests”. Therefore we believe that breaking down the complex systems by their functionalities and then identifying the interested parties for each functional feature is an effective approach for including all related stakeholders for an IS. This method will not only identify all relevant stakeholders pertaining to a specific system but will also reveal a number of association with the system for each stakeholder, which signifies the influence a stakeholder can make on the system. The higher the number, the greater influence the stakeholder can make on the system. This study adopts the definition of a stakeholder as a group or an individual who has vested interest toward an information system and can impact or is impacted by the adoption, modification, or diffusion of the system.

Pouloudi (1998) stated that a comprehensive stakeholder identification method should follow a dynamic, iterative, and interpretive process such that organizational uncertainty and instability can be accommodated by allowing the entrance and exit of stakeholders as well as considering different perceptions of other stakeholders. Therefore, our goal is to propose a feature-based method that will allow researchers to easily revise the stakeholders list as features are added, modified, or removed from an IS. The feature-based stakeholder identification method is implemented in two phases. In the first phase, we will identify the stakeholders based on specific features using several principles and guidelines established by previous studies. We will then use a second phase to rank the stakeholders based on their affiliation with various functionalities of the IS.

Phase I: Identifying Relevant Stakeholders

The first phase is incorporated using two steps – 1) Identify Features and 2) Identify Stakeholders. As stakeholders should be identified based on their interests (Donaldson and Preston, 1995), it is important that we first identify all the functionalities provided by the HIS and specify their objectives before attempting to identify the interested parties.

Step 1: Identify Features

The purpose of this step is to identify the objective of the targeted information system by identifying the distinct functionalities or features supported by the system. Identifying these features will allow better understanding of the overall as well as specific purpose served by the system in an organization. A brief description for each of the feature will also be obtained. This will help researchers to understand the purpose of each functionality and the manner it is used by the organization. Performing the first step should produce a list similar to Table 1 but should be specific to the targeted IS. Table 1 shows an example of an Electronic Health Record (EHR) system, a widely used HIS by healthcare organizations. The second column of the table lists all the features or functionalities provided by the EHR system. The third column describes the objective of each feature to and its usage. Looking at the objective, in many cases, it provides enough hints and clues to easily identify parties that are directly involved with the functionality. For example, patient portal is a common feature available in most EHR systems whose objective is to allow effective and secure web-based communication system between hospital and its patients. The objective of patient portal provides a clear indication that patients and hospital staff such as nurses and doctors are directly impacted by this feature of the EHR system.
<table>
<thead>
<tr>
<th>Features</th>
<th>Brief Description of the features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature 1</td>
<td>Physician Dashboard: A customized view of personnel and facility scheduling, test results,</td>
</tr>
<tr>
<td></td>
<td>correspondence alerts, and access to patient charts.</td>
</tr>
<tr>
<td>Feature 2</td>
<td>Test Results &amp; Orders: Gain the convenience of viewing new results and incorporating</td>
</tr>
<tr>
<td></td>
<td>details automatically &amp; electronically into the patient chart.</td>
</tr>
<tr>
<td>Feature 3</td>
<td>Interoperability: Communicate with patients &amp; referring/consulting physicians, receive results</td>
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<tr>
<td></td>
<td>with comprehensive audit tracking performed on all transactions.</td>
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<tr>
<td>Feature 4</td>
<td>Patient Portal: An effective and secure web-based communication system between you and your patients.</td>
</tr>
<tr>
<td>Feature 5</td>
<td>ePrescribing: Provides a paperless process for the management of patient medications.</td>
</tr>
<tr>
<td>Feature m</td>
<td>Mobile Access: Achieve freedom &amp; flexibility to securely access vital patient information in the</td>
</tr>
<tr>
<td></td>
<td>EHR system and make medical decisions via your tablet or smart phone.</td>
</tr>
</tbody>
</table>

Table 1: A List of Sample Features of HIS (e.g. EHR)

Step 2: Identify Stakeholders

The second step is identifying relevant stakeholders for each of the features identified in the first step. Out of five criteria suggested by Lyytinen & Hirschheim (1987) and Lyytinen (1988) which are particularly important for stakeholders identification and two of them have been adapted in this study as shown in Figure 1.

The first criterion is to use “type of relationships to IS” when identifying stakeholders, which is defined as the nature each individual is related to the functionality (Lyytinen and Hirschheim, 1987). For example, a patient portal feature of an EHR system is typically used as a communication tool between patients and physicians. Patients receive health related information using the portal and thus act as the receiver of service provided by the provider such as physicians and nurses. To implement this criterion, we adopted four categories of actors by Mantzana et al. (2007): acceptors, providers, supporters, and controllers. These groups were proposed to categorize the healthcare actors but we believe that they also provide lucid indications about the relationships between HIS and its stakeholders. In addition, no clear definition for each of these groups is given by the authors. Thus, we define acceptors as individuals who receive and accept services that are provided by HIS. Although patients are considered as the main acceptors of services for typical HIS, doctors, nurses, as well as other individuals can also be considered as acceptors depending on the technology. Similarly, providers are individuals who provide services using HIS. Supporters are individuals who maintain HIS such as representatives from IT department. Finally, controllers are individuals who have the authority to manage these technologies. In addition to these four groups, we propose to add a fifth group, producers. Producers are the individuals who are responsible for the architect, design, develop, and implementation of HIS. Using these five criteria, we believe most of the stakeholders for an HIS should be revealed.

The second criterion that we have also adopted from the past studies is the “depth of impact” (Lyytinen and Hirschheim, 1987). It is used to identify stakeholders based on their direct/indirect and internal/external relationship with the HIS. We incorporated this criterion by considering actors who have a direct stake in an HIS as well as ones who are also indirectly related or benefited from the HIS. In addition, actors who are external to the organization but somehow related or have a stake toward the HIS are also considered. For example, hospital receptionists do not have a direct stake in a patient portal system but they are indirectly benefited from the system due to the reduced workload since they are no longer overwhelmed with the unnecessary inquiries by the relatives and friends. Similarly, ePrescribing is also a widely used feature of EHR system where physicians are the internal stakeholders and pharmacists could be considered as external stakeholders.
**Phase II: Ranking Stakeholders**

Once we have a list of relevant stakeholders specific to a particular IS, we move to Phase II to rank these stakeholders. Ranking stakeholders is particularly important to reveal a number of associations with the system for each stakeholder, which signifies influences a stakeholder can make on the system. The higher the number is, the greater influence the stakeholder can make on the IS and, thus, more likely to have greater impact on the IS. In order to rank the identified stakeholders, we create a matrix of size $m \times n$ where $m$ is the number of features and $n$ is the number of stakeholders that were identified in the last phase. Using this matrix, we check each box where each stakeholder is associated with each of the features. Each stakeholder is then summed up by the number of features the person is affiliated with. The greater the number of affiliation, the larger their scope is in the list, which leads to greater impact on the system. Table 2 provides an example of stakeholder’s ranking.

<table>
<thead>
<tr>
<th>Stakeholder List</th>
<th>Feature 1</th>
<th>Feature 2</th>
<th>Feature 3</th>
<th>…</th>
<th>…</th>
<th>…</th>
<th>Feature m</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stakeholder 1</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td>3</td>
</tr>
<tr>
<td><strong>Stakeholder 2</strong></td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Stakeholder 3</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td>4</td>
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<td><strong>Stakeholder n</strong></td>
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<td>✔</td>
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</tbody>
</table>

**Table 2: An Example of a Feature-Based Method on Stakeholder’s Ranking**

**DISCUSSIONS AND IMPLICATIONS**

This study focused on proposing a stakeholders’ identification method which, we believe, is systematic, flexible, dynamic, and iterative in nature. The proposed Feature-Based method provides a systematic approach by using system functionalities for identifying stakeholders. This method is flexible and dynamic because it adapts to any changes to system that is triggered by the organizational uncertainty and instability. Any new functionality of a system can be accommodated by systematically repeating the steps identified in Phase I. Therefore, this method can also be considered as iterative.

One of the known shortcomings of prior stakeholder identification methods is that “they do not provide any guidance about its starting point” (Pouloudi, 1998). The stakeholder identification method proposed in this study specifically addresses this shortcoming. As the proposed method starts out by identifying available features associated with the IS and then identify the stakeholders associated with each of the features, the uncertainty about where to begin stakeholders’ identification process is
greatly reduced. In addition, prior stakeholder identification methods focused on project or organization level. The proposed Feature-Based method identifies stakeholders for specific IS, at the system level. Given the complexities of inter-organizational systems, this new method also breaks a complex IS into a number of subsystems, and thus, it is much simpler in nature and easier for researchers to identify the relevant parties who have stakes in the system.

The scientific rigor and practical utility of a new research model relies on proper validation of the model. Hence, it must be validated in order to show the effectiveness and efficiency of this proposed model. Due to the nature of the study dealing with inter-organization environments, a case study method will be used to validate the model. Because case study method allows researchers to study complex information systems in a natural setting and to understand their complexities (Benbasat, Goldstein, and Mead, 1987) as well as to understand the dynamics present within the setting (Eisenhardt, 1989), we will test our model using this qualitative method to gain valuable insights of these complex healthcare systems.

CONCLUSIONS, LIMITATIONS, AND DIRECTIONS FOR FUTURE STUDIES

Like all other studies, this study is not without limitations. The objective of this paper is to develop a method for identifying stakeholders which is systematic, flexible, dynamic, and iterative in nature and provides a complete list of stakeholders for a specific HIS. However, this proposed method has not been validated. Future studies can be aimed to validate this method and enhance it as well. In addition, the Feature-based method was developed with the focus on IS that are intended to be used only in the healthcare organization. However, this method can be adopted for other IS that are designed and used in non-healthcare environment as well.

Since the introduction of the stakeholder concept in management, many previous studies have zoomed on this concept from different perspectives. These studies focused on understanding their impact on projects, technology adoption, and overall organization. However, they failed to provide a systematic method in identifying stakeholders for a system that varies from one environment to another. Without a proper method to account for all stakeholders for the system that is used in a dynamic environment, it is difficult to understand the impact and roles that stakeholders play in the organization. This study proposes the Feature-Based method that provides a systemic approach for identifying system-specific stakeholders for complex healthcare information systems that are designed for inter-organizational environment.

REFERENCES


