

Electronic Medical Records Application Development: Perspectives of the Service Provider

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Abstract:

Healthcare Information Technology (HIT) is a relatively new phenomenon and refers to the use of computer applications to store, process, and use clinical, administrative, and financial information among various health care entities. HIT is widely regarded as a key to improving the quality of healthcare in the United States and potentially reducing its cost. Yet, its implementation is a continuous challenge for the healthcare industry. One of the key applications of HIT is Electronic Medical Records (EMR). The implementation of an EMR system may result in improved and more efficient care and patient safety, but it may also incur additional costs. Furthermore, if the development of the application is undertaken by an offshore vendor, it adds another layer of complexity. This research case documents the experiences in the development and implementation of an EMR system for a U.S. client by an offshore vendor. While client experiences abound in the literature, this study is unique in that it draws from the perspective of the service provider. Key findings of the study show that the major issues related to EMR development by an offshore vendor include gaining domain knowledge, requirements generation, and access to expertise. Like offshoring projects in general, client-vendor communication remains perennially important. Beyond EMR, this vendor's critical success factors in HIT projects offshore development additionally include scope containment, need for a client liaison, and managing non-functional expectations.

Keywords: Health Information Technology | Electronic Medical Records | Offshore Outsourcing | Service Provider Perspective | Critical Success Factors

Article:

INTRODUCTION

Advancements in the field of information technology (IT) have opened up several avenues for organizations in terms of their ability to innovate, save on costs, streamline business operations, gain competitive advantage, and become more profitable. One industry which has lagged behind

in the use of IT to effectively deliver innovative services is the health care industry (Menon et al., 2000). The U.S. Department of Health and Human Service defines Healthcare Information Technology (HIT) as "the use of computer applications to record, store, protect, retrieve, and transfer clinical, administrative, and financial information electronically within and among various health care settings" (HHS, 2013). Among the many benefits of HIT are: improved quality of care and access to patient data by clinicians, streamlined monitoring of public health issues and trends, enhanced ability to conduct clinical trials, and the creation of new high-technology markets and jobs (PCAST, 2010). Furthermore, HIT can improve the individual experience of care, improve the health of populations, and reduce the per capita costs of health care for populations. These three goals are referred to as the Triple Aim (Berwick et al., 2008). However, significant barriers remain, e.g., cost, technical issues, system interoperability, concerns about privacy and confidentiality, and lack of a well-trained clinician informatics workforce (Hersh, 2004).

While HIT presents a plethora of benefits to health care organizations, not all organizations have the dedicated resources to develop the necessary HIT systems or process the information produced by these systems. In other words, HIT is not the core competency of most health care organizations, whose primary goal is to provide superior health care to their patients. An attractive solution to this dilemma is outsourcing of IT services. IT outsourcing allows health care organizations to cost-effectively manage "non-core" business processes by delegating these processes to a third-party service provider who specializes in providing such services. A variant of outsourcing is offshore outsourcing or simply offshoring, where a majority of the IT services are provided in a low-cost country. Haried and Ramamurthy (2010) state that "IT offshoring is clearly a phenomenon that will not disappear in the foreseeable future having evolved from being a cost saving initiative to more of a survival strategy for many organizations" (p. 34). The growth in offshore outsourcing can be attributed to the availability of a highly skilled, low wage labor pool in the offshore countries (Jain et al., 2011). Other factors include increased competition in the marketplace and increased pressures for globalization (Hirschheim and Dibbern, 2006). Another important reason is the time difference between the health care organization and the outsourcing service provider, which allows information processing to take place round the clock (Palvia et al., 2011).

One of the primary applications in HIT is Electronic Medical Records or simply EMR. The National Alliance for Health Information Technology (NAHIT) defines EMR as an electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organization. An EMR system is central to any computerized health information system and a recent report found the implementation of EMR as the topmost concern of U.S. hospital executives (Palvia et al., 2012b). This study investigates a case where an offshore service provider developed an EMR system for a U.S. based healthcare organization. The case is analyzed from the perspective of the service provider (i.e., the vendor) and delves into key issues for the service provider and critical success factors in the development process. Most prior studies in offshoring have focused on the client perspective (Koh et al., 2004; Lee et al., 2004). Given that there is a dyadic relationship between the client and the vendor, this study fills an important gap by providing the vendor perspective along the lines of Jiang et al., (2008) and Levina and Ross (2003).

The rest of the article is organized as follows. A brief review of the literature on Health IT, EMR, outsourcing, and offshoring is presented in the next section. The third section provides details of the research methodology. Results of the case analysis are provided next. The discussion section develops insights and includes implications for practice. The paper ends with some concluding remarks.

LITERATURE REVIEW

Health Information Technology and Electronic Medical Records

The U.S. Department of Health and Human Service defines Healthcare Information Technology as "the use of computer applications to record, store, protect, retrieve, and transfer clinical, administrative, and financial information electronically within and among various health care settings" (HHS, 2013). Healthcare Information Technology is widely regarded to be one of the means for improving the quality of healthcare and potentially reducing its cost in the United States (Dey et al., 2007; Koshy, 2005; Wu et al., 2006). Recent US administrations have emphasized the utilization of computers and information technology in streamlining healthcare and reducing its staggering costs where approximately 20% of expenditures are related to the storing, processing, and dissemination of information (Thompson and Dean, 2009). Calls for electronic health records, e-prescribing and other forms of health IT improvements have been sounded for more than a decade, and recently these calls have been supported with substantial financial incentives. For example, President Barack Obama has proposed a massive effort to modernize healthcare by making all health records standardized and electronic. The American Recovery and Reinvestment Act (Stimulus Bill), signed by President Obama on February 17, 2009, includes billions of dollars for health information technology. Yet, the implementation of IT in healthcare has been a continuous challenge in many countries including the United States. As Hersh (2004) points out there are significant challenges in HIT implementation. These include huge initial costs, technical issues, system interoperability, concerns about privacy and confidentiality, and lack of a well-trained clinician informatics workforce.

A recent article (Palvia et al., 2012b) reported the HIT issues in the U.S. based on the opinions of hospital CEOs and CIOs. Among the top ten issues, the implementation of electronic medical records is ranked the highest. Included in the top ten are issues related to: improving healthcare quality by the use of information technology; change management, privacy, security, and accuracy of electronic records; and decision support applications.

Electronic Medical Record (EMR) is defined by the National Alliance for Health Information Technology (NAHIT) as an electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organization. Another term: Electronic Health Record (EHR) is frequently used in the literature. While the two terms EMR and EHR are often used interchangeably, there is a clear difference in scope. An EHR is the aggregate electronic record of an individual across more than one health care organization. Thus while EMR and EHR have similar objectives (i.e., improve coordination of patient healthcare), an EHR places the further requirement of ensuring interoperability with the systems of other providers. This study focuses on EMR alone.

While adopting an EMR has become a high priority for many medical practices in the U.S., they are still slow in fully implementing these systems (Menachemi et al., 2007). As an example, while 56% of acute care units (Ford et al., 2008) are in the process of changing from paper records to electronic records, only 5% of small ambulatory care offices are in the process of conversion. The percentage of office-based physicians with a fully-functional EHR system was projected to increase to 10% by 2010, but adoption remains slow (Hsiao et al., 2010). This rather anemic adoption rate seems surprising considering the many potential benefits of adoption including not only financial incentives, but administrative efficiencies, cost savings, and enhanced quality while also avoiding longer term punishments for failure to adopt. However a more nuanced review of the interoperability challenges along with the strong professional cultural tradition regarding the role of the physician (Katz and Kahn, 1966) reveals the systemic complexity of implementing electronic medical records. This systemic complexity frequently results in frequent EHR implementation failures ranging from running over-budget or overschedule, to not meeting all of the business requirements, to outright project abandonment (Kaplan and Harris-Salamone, 2009).

Outsourcing and Offshoring

IS/IT outsourcing is the execution of IS/IT operations by a vendor firm which specializes in performing the activity and usually does so for many firms (King, 2007). The vendor is able to consolidate work from several clients and thus enjoys the benefits of economies of scale, performance advantage, and superior technology. Outsourcing can be domestic or offshore. In domestic outsourcing, the client and the vendor are in the same country.

Offshore outsourcing or simply, offshoring, is when the vendor is in a different country than the client. Variations on offshoring include nearshoring, middleshoring, and farshoring depending on the geographical distance of the vendor from the client. Offshore outsourcing is different from domestic outsourcing in that there is an increase in complexity due to organizational, geographical, and cultural differences between the client and the service provider (Westner and Strahringer, 2010). Furthermore, traditional governance activities such as monitoring, control, coordination, and communication of processes are more complicated in offshoring relationships (Gopal and Koka, 2010). Chaudhary and Kishore (2010) use a single case study to review three different outsourcing governance forms namely transactional, contractual, and relational governance along eight different governance characteristics of strategic view, social interaction, trust, shared vision, asset specificity, uncertainty, reciprocal investments, and outcome measures priority. They found that the relational governance model performed better along the eight dimensions compared to the transactional and contractual governance models. Despite the issues related to governance, offshore outsourcing is appealing to clients because they are able to capitalize on low-cost, high-quality labor markets overseas (Ranganathan and Balaji, 2007). Seshasai and Gupta (2009) state that while cost-savings has been the major factor in the decision to offshore outsource, the potential to achieve drastic reductions in turnaround times for major endeavors using concepts such as the 24-Hour Knowledge Factory will spur the growth in offshoring, especially in the IT offshore outsourcing. King (2008) adds that the main reason cost-savings is an important element of offshore outsourcing arrangements is that it is usually easy to demonstrate and quantify. IT outsourcing is moving away from cost management to collaborative innovation (Willcocks et al., 2011). In this context it is important to understand the

difference between collaboration and outsourcing. Collaboration is "an agreement to innovate around a locus using similar knowledge base but between different functional units or companies" (Rai et al., 2010, p. 33) while outsourcing is "a descriptor of a business model and an operational frame that enables collaboration" (Rai et al., 2010, p.33). Clients' decisions to offshore outsource have also been made easier due to vendors' investments in Six Sigma quality control systems and process capabilities, such as Level-5 Capability Maturity Model (CMM) certifications (Kaiser and Hawk, 2004).

Research in outsourcing can be characterized into three streams. The first stream utilizes a strategic management perspective to investigate outsourcing research using firm capabilities point of view which is an extension of the resource-based view of the firm (Mehta and Mehta, 2010; Palvia et al., 2010; Poston et al., 2010; Ranganathan and Balaji, 2007). The second stream is from an economics perspective (Aron et al., 2005; Rao, 2004; Sia et al., 2008; Tiwana and Bush, 2007). Theories commonly used in this stream include the transaction cost economics theory and agency theory. The third and the more recent stream uses a social perspective to focus on building successful relationships between the client and the service provider using mechanisms beyond the use of formal contracts (Jain et al., 2011; Mehta and Mehta, 2010; Olsson et al., 2008; Rai et al., 2009). This stream utilizes theories such as social capital theory, social embeddedness theory, and relational exchange theory. An example of scholarly work focusing on offshoring from all three of the above-mentioned perspectives is the work done by Haried and Ramamurthy (2010) who use a multi-site case study approach to investigate the economic, strategic, and relational issues in IT offshoring in the context of the client and vendor relationship.

While most of the literature on offshoring tends to focus on the client's perspective, few studies (Levina and Ross, 2003; Mehta and Mehta, 2010; Palvia et al., 2010; Palvia et al., 2011) have researched offshoring from a vendors' perspective. Levina and Ross (2003), using a single revelatory case study, concluded that the vendor's efficiency was based on the economic benefits derived from the ability to develop a complementary set of core competencies. Palvia et al. (2010) developed a three-level capability-quality-performance (CQP) theoretical framework to understand offshoring vendor outcomes and their antecedents. Mehta and Mehta (2010) used a vendors' perspective to study how relational investments made by the client improve IT outsourcing partnerships. Palvia et al. (2011) identified critical outsourcing issues for IT vendors in India. They classified the issues in three categories: client relationship, client readiness, and international barriers.

Several researchers have sought to identify critical issues in outsourcing and offshoring. Oza and Palvia (2007) identified critical success factors common to both clients and vendors as: managing constant communication, having a structured process, appropriate resource allocation, and managing expectations. Other factors are collaboration (Levina and Vaast, 2008), communication (Wareham et al., 2007), and coordination (Olsson et al., 2008). Pick and Ramakrishna (2009) found that static, dynamic, and contextual factors determine partnership quality which is essential for the success of global collaborative project that mimics outsourcing. Levina and Vaast (2008) add that offshore outsourcing introduces additional key issues such as cultural, temporal, and organizational differences between the client and the service provider. However, Palvia et al. (2011) found that issues related to cultural, language, and time-zone

differences are the third most important, behind issues related to developing fruitful working relationships with the client and issues related to the client's organizational readiness for offshoring. Effective relationship management is a frequent determinant of outsourcing success (King, 2008). Willcocks et al. (2011) argue that contrary to popular belief that the outsourcing contract is the single most important attribute related to success of an outsourcing project, it is in fact the identified good relationships between a customer and an outsourcing service provider that is the most important factor when it comes to effective service delivery and successful contract management.

Health IT Offshoring

As in other industries, outsourcing and offshoring have the potential of creating tremendous opportunities to health care organizations to save costs and streamline business processes. In recent years, developed-world based healthcare providers are increasingly outsourcing various medical functions such as medical transcription, billing and insurance claims, tele-imaging (e.g. reading and interpreting MR, CT scan and X-ray images) and telepathology (e.g., analysis of tissue samples) (Kshetri and Dholakia, 2011). However, American hospitals have been reluctant to send their IT work to overseas companies (Worthen and Sharma, 2010) due to reasons related to efficiency, sensitive information, and legal complications. A recent study found that most US hospitals are not involved in IT-based offshoring (Palvia et al., 2012a). Only medical diagnosis registered the most IT-based offshoring, with almost 10% of the hospitals involved in it to some extent. The next two services are medical data entry at 4.6% and medical software development at 3.9%. EMR offshoring was not even mentioned; thus it is a nascent area worthy of further investigation.

METHODOLOGY

This research uses a case study methodology to understand the key issues faced by offshore outsourcing service providers. Yin (2009) defines a case study as an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident. Lee (1989) adds that a case study is a scientific method that helps understand how inquiries in natural science proceed. Key characteristics of case studies include the following: the phenomenon of interest is studied in a natural setting without any experimental control or manipulation, one or few entities are examined, and the complexity of the unit is studied intensively (Benbasat et al., 1987). Case studies are one of the commonly used methodologies in IS research along with surveys and laboratory experiments (Palvia et al., 2004) due to the fact that they are more explanatory in nature, they provide rich explanation of the phenomenon, and they provide an extensive real-life context (Yin, 2009).

The steps involved in a case study methodology include planning the case study, designing the case study, preparing the case study, collecting data using the case study, analyzing data, and sharing results (Yin, 2009). We used a single case holistic design since the offshore outsourcing service provider we study is representative of a typical case for identifying the key issues from an offshore outsourcing provider perspective. In preparation for the case study, we applied for and received the Institutional Review Board approval, prepared the case study protocol, and used

a screening process to identify the single case. The case study protocol involved preparing field procedures and case study questions. During the screening process, we screened candidate cases to identify the one most likely to yield the best data.

In-depth qualitative interviews were conducted and company documentation was reviewed to collect evidence from the case study. Interviews are one of the most important sources of case study information (Yin, 2009). The interview questions were developed based on an extensive review of the literature on offshore outsourcing. Some of the strategies identified by Yin (2009) were used to analyze the qualitative data. The final step in the methodology is to present the results, which we do below.

ANALYSIS AND RESULTS

The Offshore Outsourcing Service Provider

The company we chose for our single case holistic design is Key Management Group (KMG), a "global software development company providing high-quality IT solutions to the Healthcare & P&C Insurance verticals worldwide using a very diverse range of technologies" (KMG, 2013). KMG was established in 1990 and has quickly become one of the top IT solutions provider in the world due to its proven track record of providing IT services in the Property and Casualty (P&C) insurance industry. KMG was ranked as one of the top 100 software companies in India (KMG, 2013).

KMG specializes in building applications using the Service Oriented Architecture (SOA) through the use of technologies such as IBM iSeries, IBM Mainframe, COBOL, RPG, Microsoft.NET, and Java (KMG, 2013). It provides a wide range of services including, software development (portals, mobile apps, Electronic Health Records (EHRs), lab management software etc.), interface development (interfacing EHR systems external systems using Health Level Seven International standard (HL7)), application support and maintenance, legacy migration and maintenance, web-enabling solutions, testing services, business analysis support, business process outsourcing (BPO), and Knowledge Process Outsourcing (KPO) (KMG, 2013). The company's service delivery models include pure onsite, pure offshore, and hybrid (a mix of onsite and offshore) models.

Headquartered in New York, KMG has three offshore development centers in India. KMG's 30 professionals in the U.S. are supported by 300 technical professionals in India. KMG's organization structure is as follows. The company is headed by a CEO and a President. The company is split into two units, one in the U.S. and one in India, with each unit having its own Vice President (VP) and Associate Vice President (AVP) level personnel reporting to the President and heading their own technical, sales, human resources (HR), finance, and administration teams (KMG, 2013). KMG's organizational structure is presented in Figure I.

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Vice President (VP) and Associate Vice President (AVP) level personnel reporting to the President and heading their own technical, sales, human resources (HR), finance, and administration teams (KMG, 2013). KMG's organizational structure is presented in Figure 1.

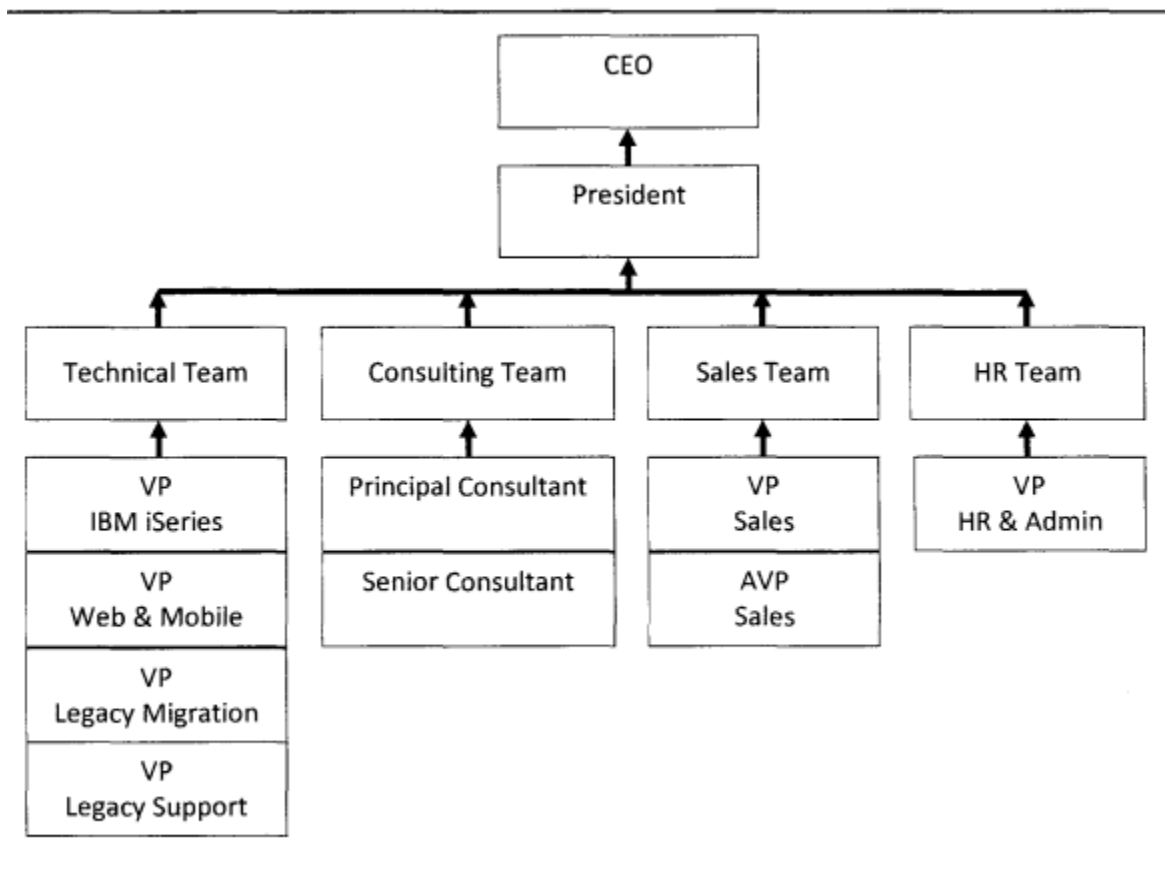


Figure 1. KMG Organizational Structure

The Offshore EMR Project In order to understand the key issues faced by offshore outsourcing service providers, this study investigates KMG's development of an Electronic Medical Record (EMR) for one of its primary clients¹. The client was a group of practicing physicians in the U.S.

As described by KMG, the EMR industry has undergone a dramatic change in the last three years. In 2008, the U.S. President announced a stimulus package aimed at doctors who opt for an EMR system. The federal government laid out very specific criteria for classifying an EMR as qualified software for this purpose. These guidelines were compiled by the Office of the National Coordinator for Health Information Technology (ONC). The first stage of these requirements went live in 2010 while the second stage will go live in 2014.

KMG is one of the very few software companies to have developed two separate EMR systems for two separate clients. This project describes the first EMR that was completed in 2010. Called MedScribe, it covers the full gamut of operations at doctors' practices. It includes four major functions. The Scheduler function starts with the patient calling in for an appointment and includes adding patients, updating their information and scheduling appointments. The Front

Office function includes check in, check out, and correspondence. The Exam Room function allows for nursing notes, doctor's notes, creating medical orders and electronic prescriptions, and verifying lab tests/results. Finally, the Billing function provides for submitting claims, patient billing, end-of-day processing, explanation of benefits (EOB), and accounts receivable (AR) processing.

The scope of the EMR project under investigation was defined by the guidelines of the ONC Stage 1 criteria. The Stage 1 criteria for health professionals require meeting 15 core objectives, 5 objective from a 10-item menu set, and 6 clinical quality measures (CMS, 2010). The key overarching requirement on KMG was that the client wanted to keep the user interface as simple and friendly as possible. This is keeping in line with the known fact that the doctors are not computer savvy and want to simplify the data entry process as much as possible. It was to be completed in around 18 months from the start of the project. The project was estimated at 2,000 person days. It had around 100 major data entry screens.

The EMR project, like other projects at KMG, followed an iterative delivery methodology. The project was broken down into multiple delivery milestones and each of the phases was treated as an independent project with its own scope finalization, requirement document, design, construction, and user accept testing. There was considerable iteration within each phase of the project, to the satisfaction of the client. The project went live sometime during the middle of the delivery timeframe.

KMG follows best practices for project documentation, coding and quality assurance. According to the President of the company:

"Our developers follow a coding standard approved by the client. They also do the unit testing. There are random peer reviews. The QA cell does the integration & regression testing based on test scripts approved by the client."

Success Metrics

According to the KMG President:

"A project is successful if it stays within the projected costs and gets delivered on time. It should meet the non-functional expectations (Speed, Scalability, Security etc.). It should have minimum post delivery issues."

KMG delivered about three months after the scheduled date. This was only a slight delay and the expected delay was communicated to the client. They also had a sign-off by the client on the delay. Moreover, the project costs were within the expected range. Overall, the project was deemed successful despite the schedule overrun since KMG was in constant communication with the client and the client signed off on the overrun prior to the completion of the original project schedule.

KEY ISSUES FOR THE SERVICE PROVIDER

The main objective of this research case is to provide an understanding of the key issues faced by offshore outsourcing service providers in EMR development. Since, there was a delay of three months in project delivery, we asked for an explanation. The following was the main reason that was provided for the delay:

"The business knowledge related to the certification criteria was the biggest challenge. The criteria was newly announced and our team had to understand the requirements. "

This is not surprising since prior studies have established the importance of domain knowledge on the effectiveness of the outsourcing relationship. For example, Tiwana (2004) found that "effective outsourcing requires knowledge congruence-that is, a good fit in terms of the business and technical knowledge across the client-vendor dyad" (p. 3).

A recent study (Palvia et al., 2012b) identified the critical issues faced by offshore vendors in an outsourcing relationship. The top ten issues confronting vendors from India according to this study are shown in Table 1.

Table 1. Top Ten Critical Vendor Issues (Source: Palvia et al. 2011)

Offshore Vendor Key Issues
Lack of communication with the client
Gathering data to make a compelling proposal to the client
Availability of experts on the client's processes (or systems) during knowledge transfer
Attrition of our company's staff by the client before completion of knowledge transfer
Lack of documentation of client's existing processes (or systems)
Unclear communication channels with the client
Reaching agreement with the client on ROI (Return on Investment)
Lack of involvement from the client's top management team.
Attrition of the client staff before completion of knowledge transfer
Poorly designed network infrastructure at our own offshore s

The KMG management was asked to comment on these issues. They ranked these issues in the following order: lack of experts, communication gaps, resistance from client employees, lack of documentation, and lack of involvement.

Several studies point to specific risks related to international barriers. These include legal and regulatory concerns, language differences, time zone differences, and cultural issues (Willcocks and Lacity, 2006; Sarker and Sahay, 2003; Lee-Kelly and Sankey, 2008). The KMG President offered the following explanation on these issues:

"The language/cultural/time zone etc. does not make any difference at all. We are an outsourcing company and we can handle these easily."

In the more recent study (Palvia et al., 2012), cultural, language, and time barriers are listed among the last by offshore vendors. These vendors feel that that they can address these issues

adequately as long as they are able to work effectively with competent and capable clients. It seems that over the years, offshore vendors have developed enough capability and expertise to effectively deal with issues related to cultural, language, and time barriers.

Based on these findings, the key issues from the service provider's perspectives are summarized in Table 2. It should be noted that many of the KMG issues mirror the ones identified in Table 1 earlier for all Indian vendors. The issue on the top of the list is domain knowledge. Health IT is a new field and most vendors had no or little experience in developing these systems. The health domain is entirely different from the rest of the business world. For a business analyst to be proficient in this field, he or she needs to have a good knowledge of not only the medical terminology but also the processes and procedures in hospitals, laboratories, doctors' offices as well as insurance companies and government agencies. This is no easy task and requires significant investments of time and energy.

Table 2. Top Critical Vendor Issues for KMG

Offshore Vendor Key Issues
Domain Knowledge
Understanding requirements
Lack of experts from the client side
Communication gaps
Resistance from client employees
Lack of documentation
Lack of client involvement.

In the business world, users typically have difficulty articulating their functional requirements for the system or may have multiple viewpoints (Darke and Shanks, 1997). In healthcare, the handicap in domain knowledge by the business analysts and the uniqueness of various healthcare processes make the task of requirement elicitation and finalization doubly difficult. This is further compounded by the lack of IT savviness, expertise and business knowledge on the part of physicians and other medical staff. One interesting aspect of understanding requirements was the non-functional expectations. Users have implicit expectations about how well the software will work. These characteristics include how easy the software is to use, how quickly it executes, how reliable it is, and how well it behaves when unexpected conditions arise (Stellman and Greene, 2005).

CRITICAL SUCCESS FACTORS IN OFFSHORE OUTSOURCING

While the above issues refer to the specific EMR project, the overall success of the service provider and its development projects in Health IT depend on a number of factors. KMG identified a number of factors for its success. These factors are across all of the projects and there is necessarily some duplication with the key issues identified above. Table 3 lists the critical success factors. We comment on the ones not listed earlier.

Table 3. Critical Success Factors for the Service Provider

Requirement Finalization
Limiting the Scope of the project
Ensuring the Client has a liaison person
Overcommunication
Acquire as much domain knowledge as possible
Ensure the non-functional expectations have been understood.

System developers face several risks in building information systems. One of them is the growing scope of the project caused by unclear objectives, changing goals, and scope creep (Schmidt et al., 2001). Thus from the vendor's point of view, it is important and advantageous to freeze the requirements and limit the scope of the project. KMG also emphasized the need for communication, going as far as engaging in over communication in order to make sure that the requirements and expectations are properly addressed. One mechanism to facilitate communication is the client liaison person. Client liaisons act as communication conduits between the technical staff and the business unit, but can also provide oversight by articulating requirements, and make decisions about a system's functionality, approve deliverables, foster common goals and visions, etc. (Kirsch et al., 2002). Furthermore, they provide the vendor a single access point so that the communication is more expedient with less ambiguity.

DISCUSSION

There are several insights we learned from this research case study. First and foremost, even experienced offshore outsourcing service providers such as KMG can run beyond the project schedule resulting in delayed delivery to the client. This is important since KMG defines a successful project as one that stays within the projected costs and one that is delivered on time. While KMG was able to keep the project costs under control, it experienced a delay of three months. While the delay was not excessive and was acceptable by the client, it was caused by the additional time it took KMG's development team to gain the business knowledge related to the health IT domain and the EMR certification criteria. The KMG President explained that the company did not face this issue in its second EMR project. The important lesson is that there is a steep learning curve even for experienced developers when they delve into new domains such as Health IT. They need to account for the learning curve both in terms of additional resources and extra time.

Another finding related to the above is the acquisition of domain knowledge. Besides the vendor's own shortcomings in this area, it is also related to the slow evolution of IT in healthcare and the organizational culture of healthcare providers. Thus even though the domain knowledge exists with the healthcare providers, it may be uncodified or undocumented. Furthermore, this tacit knowledge may be very difficult to obtain from the medical personnel who neither have the tradition nor sufficient knowledge or training in the knowledge transfer process. Even if some of these people exist, they may not be readily accessible to the development team.

Aside from the above issues, many of the same issues were observed in HIT outsourcing as in the general outsourcing/offshoring literature, such as the importance of communication, client involvement, and documentation. One interesting observation was the emphasis on the

nonfunctional expectations. It may be that it carries a special meaning in the Health IT domain as these professionals have only been recently introduced to IT applications and may have developed unrealistic expectations. These users may have implicit expectations which are hard to codify, e.g., how well the software will work, how easy the software is to use, how quickly it executes, how reliable it is, and how well it works under unexpected conditions (Stellman and Greene, 2005).

What is also revealing are the issues not included as critical concerns by KMG. In an offshoring context, we had expected international barriers to be of major concern, which include geographic distance, language differences, time zone differences, cultural issues, and legal and regulatory concerns (Willcocks and Lacity, 2006; Sarker and Sahay, 2003; Lee-Kelly and Sankey, 2008). To our surprise, these issues were not considered critical at all. It appears that offshore vendors, thanks to technology and accumulated experience, have overcome these issues. We were similarly surprised by the same phenomenon reported in an earlier study (Palvia et al., 2011), but this study has confirmed that the criticality of these issues is now a thing of the past. In essence, technology and sound management practices have moved them to the background.

CONCLUSION

The main objective of this research case study was to provide an in-depth understanding of the key issues faced by offshore outsourcing service providers in the delivery of Healthcare IT services. While several studies in the IS literature have focused on key issues in HIT offshore outsourcing from the client's perspective, very little is known from the vendor's perspective. In the context of the Electronic Medical Record application, we found that the service provider found the lack of domain knowledge, understanding of requirements, and finding client experts as among its toughest challenges. In Health IT, overall, the critical success factors also included: limiting the scope of the project, ensuring that the client has a liaison person, and understanding the non-functional expectations. As was expected, communication with the client and client involvement were also deemed critical consistent with the IT outsourcing literature. What was also revealing was that international issues related to distance, time, culture, and language have been adequately addressed by the vendors and no longer rise to the level of heightened concern.

Health Information Technology is a relatively new area of IT application; thus also a new area of research for IS academicians. The opportunities to understand various phenomena in Health IT are limitless. We hope that further research will continue in this area and some of the issues we addressed in this article will undergo further scrutiny leading to a sound body of knowledge.

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