

2-2011

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Conference Paper · February 2011

DOI: 10.1109/HICSS.2011.342 · Source: IEEE Xplore

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Physician Interaction with Electronic Health Records: The Influences on Digital Natives and Digital Immigrants

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Abstract

The integration of EHR (Electronic Health Records) in IT infrastructures supporting organizations enable improved access to and recording of patient data, enhanced ability to make better and more-timely decisions, and improved quality and reduced errors. Despite these benefits, there are mixed results as to the use of EHR. The literature suggests that the reasons for the limited use relate to policy, financial and usability considerations, but it does not provide an understanding of reasons for physicians' limited interaction and adaptation of EHR.

Following an analysis of qualitative data, collected in a case study at a hospital using interviews, this research explains how physicians interact with EHR. The key contribution of this research is explaining how physicians interact with EHR in terms of concepts that are grounded in the real world experiences of physicians.

1. Introduction

Research has shown that the healthcare industry is plagued by rapidly increasing costs, poor quality of service, lack of integration of patient care, and lack of information access to EHR [3,5,24,35,41,51]: “Even though U.S. medical care is the world’s most costly, its outcomes are mediocre compared with other industrialized nations” [9, p.2]. Medical errors are a major problem that decreases the quality and increases the costs of the U.S. healthcare system. Medical errors result in 98,000 deaths a year and many more injuries, and as a result, patient safety has become a top priority in U.S. healthcare [34].

The use of information technology (IT) has the potential to help healthcare organizations improve quality of service while reducing costs. The California HealthCare Foundation [26] estimated that California could save more than \$3.2 billion a year and reduce the number of medication-related injuries by 250,000 a year if California healthcare clinics used electronic health records (EHR) to handle medication ordering and diagnostic tests. The Institute of Medicine (IOM, 2001) reported that the U.S. healthcare system is “fundamentally broken” and called on the federal

government to make a major investment in information technology in order to achieve the changes, such as the “commitment to technology to manage the knowledge bases and process of care” [25, p. 178], needed to repair the broken healthcare system.

During the past 25 years, many medical records have been converted from a handwritten record format to an EHR format, and studies [3,45,58,60,12,38] have indicated that EHR is complicated and requires a serious, sustained commitment to human resources, process re-engineering, technology, and funding. The healthcare system has been slow to take advantage of EHR and realize the benefits of computerization (McDonald, 1997): that is, improved access to and records of patient data, enhanced ability to make better and more-timely decisions, and improved quality and reduced errors.

It is commonly assumed that U.S. healthcare services organizations are approximately 10 years behind the information systems (IS) curve when compared to organizations from other industries of comparable size and complexity [40]. According to IOM (2001), “healthcare delivery has been relatively untouched by the revolution in information technology that has been transforming nearly every other aspect of society” (p. 15). This inability to take full advantage of computerization is unfortunate because EHR has the potential to improve patient care and patient safety. In 2007, however, the American Hospital Association reported that only 11% of hospitals had fully implemented EHR, and these hospitals were likely to be large, urban, and/or teaching hospitals. Vishwanath & Scamurra reported less than 10% of physicians in different practices and settings in the US use EHR, whereas more than half of the physicians in countries like Sweden, Netherlands and Australia have adopted EHR [64]. Blumenthal (2009) cites only 1.5% of US hospitals have comprehensive EHR systems. A similar 2009 study by the American Hospital Association shows less than 2% of hospitals use comprehensive EHR and about 8% use a basic EHR in at least one care unit. These findings indicate the adoption of EHR continues to be low in US hospitals [38].

The research question investigated in this study is how is physician interaction with EHR affected by their experience with information technology? This question is investigated through a qualitative study that examines how physicians interact with EHR. Open coding was used to analyze the data and to develop concepts explaining these interactions in terms of the events, actions and communications carried out among the physician stakeholders. Eisenhardt's case study approach and open coding analysis grounded the results in the real world situation. As a methodological contribution, the case study of a hospital with Eisenhardt's case study approach, propositions and open coding for data analysis is an innovative combination of research methods because it enables concepts and relationships to be arrived at and then assessed using the unfolding literature step from Eisenhardt and theoretical sensitivity from open coding. This combination of approaches strengthened the contributions of this study by enabling the results to be generalized to models and relationships. The research provided theoretical contributions by presenting the Processes and Infrastructure model dealing with digital immigrants and digital natives. In addition, implications of this study for future research and practice are discussed.

2. Theoretical background

Information technology has been used by many organizations for the past 40 years. Manufacturing, banking, finance, and other industries have capitalized on new technology and experienced increased quality, lower costs, and a competitive advantage. There are many examples of IT's benefits: (a) improved customer relationship management and knowledge management, (b) cost reductions, and (c) improved quality. IT, however, has produced less significant results in the healthcare system. It is routinely possible to access bank accounts electronically from anywhere in the world, but it is often impossible to access medical information from an office next door. IOM (2001) claimed that the healthcare system needs to join the IT revolution, and improved information systems may be a critical factor for improving the healthcare system because of the pervasive need to access, record, and share information in order to provide high-quality medical care [59]. EHR is a journey that has just started [43].

Knowledge and learning play important roles in the use of IT, and researchers have developed the diffusion, adoption, and acceptance theories to explain how people adopt, accept, and use complex organizational technologies. Attewell (1992) defined complex organizational technologies as "technologies that, when first introduced, impose a substantial burden

on would-be users in terms of the knowledge needed to use these technologies effectively" [19]. From an organizational learning perspective, Attewell defined technology assimilation as "a process of organizational learning in which individuals and an organization as a whole acquire the knowledge and skills necessary to effectively apply the technology" [19,p. 1345]. The burden of learning creates a knowledge barrier that inhibits the diffusion of IT. In these cases, the use of IT can be inhibited as much by the ability to adopt IT systems as the desire to adopt these systems. Consequently, IT penetration into the market from which the stakeholders could benefit is seriously affected and the benefit undermined.

According to Prensky (2001), digital natives are people who have "spent their entire lives surrounded by and using computers, video games, digital music players, video cams, cell phones and all the other toys and tools of the digital age" (p. 1). Digital natives are used to receiving information quickly, like to parallel process and multitask, prefer their graphics before their text, prefer random access, perform best when networked, and thrive on instant gratification and frequent rewards. Digital immigrants tend to adopt and use technology, but they retain their digital immigrant accent, which can be seen in such things as turning to the Internet for information second rather than first, reading the manual for computer use rather than assuming the program will teach them how to use it, or printing their email. The differences between digital natives and digital immigrant are frequently a focus of training and education efforts, and these two groups of IT users tend to favor learning

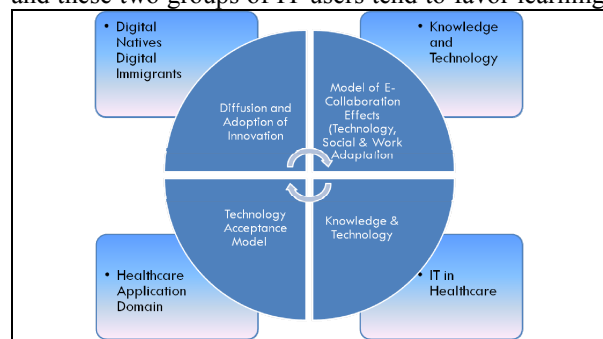


Figure 1Theoretical Lens

in different environments and learn effectively from different methods [46].

Figure 1, Theoretical Lens, depicts the theories and influences providing the lens for this research effort. The healthcare system is a complex organization characterized by independent professional (physicians and healthcare providers) knowledge workers working as independent professionals. The ability for these knowledge workers to access data effectively and efficiently would improve the quality of work processes and patient care. However, EHR,

which enable people to work effectively and efficiently access data, have been underused by U.S healthcare professionals such as physicians. In order to improve the use of IT in the U.S. healthcare system, it is necessary to understand what healthcare professionals, especially physicians, think about their adaptation of EHR; therefore, this research was guided by the research question “How are physicians’ interaction with EHR affected by their experience with IT?”. It examined physician interaction with EHR and the influence of digital natives and digital immigrants.

2.1 Physician adaptation

The EHR has the potential to provide continuity of service and could be a tool supporting collaboration as physicians increasingly work with each other and other service providers. Previous technology research [47,48,49,50] has investigated collaboration effects. The Model of E-Collaboration Effects provides insight to inform the Physician/EHR research in the areas of collaboration, coordination, communication and adaptation. In addition, the adaptation insights at the work, social and technology levels inform this research.

The model of e-collaboration effects describes people’s interaction with collaborative technologies. According to the model, when people use technology to work with each other, they go through technological, work, and social processes in order to adapt to new work environments [49,50]. The adaptation of new technology in collaborative relationships occurs when members of a group learn how new technology affects their work relationships and the work environment [48,49,50]. Successful collaboration requires social adaptation by team members, who must learn to conform to new knowledge, rules, and patterns of interaction.

Work adaptation occurs when people adapt the technology to their own ways of working. The work-adaptation process takes place when groups are involved in changing organizational norms and values while using collaborative technology. IT affects the work process itself and the way in which work is carried out [49,50].

Technology adaptation occurs when people learn how to use technological tools to achieve their goals. The more flexible the technology, the easier it is

for people to use the technology to meet their needs.

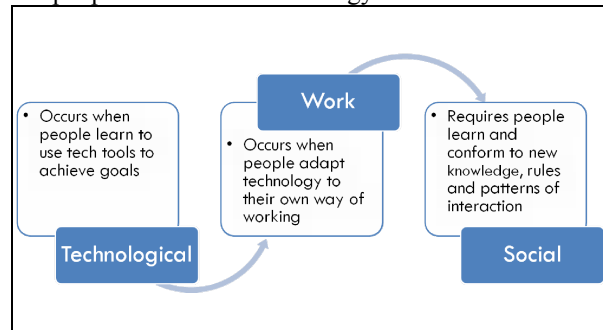


Figure 2: Physician Adaptation Model

Physicians using technology go through technological, work and social processes to adapt to new work environments. IT affects work relationships and environments.

3. Research methodology

This study uses a qualitative research method to examine physician interaction with EHR. The guiding research question is: “How are physicians’ interaction with EHR affected by their experience with IT?” It uses Eisenhardt’s case study approach, interviews as the primary data collection and open coding for data analysis. This is an innovative combination of research methods because it enables concepts and relationships to be arrived at and then assessed using the enfolding literature from Eisenhardt and theoretical sensitivity from open coding. Theoretical sensitivity allows the researcher to have insight and to give meaning to the events and happenings in the data. It allows being able to see beneath the obvious to discover the new. The Eisenhardt method was chosen as it: 1) Generates relationships or theory with constant comparison literature; 2) Emergent theory is likely to be testable with constructs that can be readily measured; 3) High likelihood of valid relationships, models or theory because the theory building process is tied to data and other evidence.

The investigation of physician interaction is complex, vague and context specific. We do not know why certain physicians use EHR and others choose not to use EHR. The qualitative methods used in this research can yield data from which process relationships and models and richer explanations about how and why processes and outcomes occur can be developed [39,61,32]. Qualitative methods provide researchers with the ability to discover relationships from data that is systematically gathered and analyzed [28].

Interpretivism is a type of qualitative research that allows the researcher to ‘interpret’ or unearth the meanings discovered in the research environment. This

research is interpretivist research as defined by Klein & Myers as it assumes that a physician's knowledge of reality is gained through social constructions such as language, consciousness, shared meanings, documents, tools, and other artifacts. Interpretive methods of research in IS are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" [62, p. 389]. The study will use an interpretivism approach to produce an understanding of physician interaction with EHR.

The researcher investigates the way physicians construe, conceptualize, and understand events, concepts, and categories related to EHR interaction. This allows the researcher to develop an understanding of the physician perspective of EHR interaction. It is necessary to utilize a rich, detailed understanding of the physician's feelings, thoughts and meanings associated with the EHR. This research is necessary to investigate the real world constraints, such as limited ability, time constraints, environmental or organizational limits, or unconscious habits, which may impact the physician use or nonuse. In order to make discoveries of this type, the researcher must have rich detail and understanding of the physician perspective.

Physicians have demonstrated great variation in EHR use depending on specialization [22,27,7,13,14,30,42,13,14] and type of practice ownership [13,14]. Physicians have the ability to choose to directly utilize the EHR or to avoid use of the EHR. In addition, the physician has the ability to impact others in the organization by the nature of their position. Therefore, they were selected as the target interview audience. The physician selection was based on the literature review and was designed to emphasize variety within the sample.

Open coding is used to analyze the data and develop concepts as they relate to physician interaction with EHR. The qualitative method and open coding analysis enables discovery of the relationships in the real world situation. This is an innovative combination of research methods because it enables concepts and relationships to be arrived at and then assessed using the enfolding literature from Eisenhardt and theoretical sensitivity from open coding. Theoretical sensitivity allows the researcher to have insight into and to give meaning to the events and happenings in data. "Insights do not just occur haphazardly; rather, they happen to prepared minds during interplay with the data [57, p. 47]". Eisenhardt's enfolding the literature step complements the development of sensitivity. "An essential feature of theory building is the comparison of the emergent concepts, theory, or hypotheses with the extant literature [17, p. 544]". This research utilized

theoretical sensitivity and enfolding the literature to develop the lens for the effort.

In order to investigate physicians' interactions, this research employs a case study with interviews to elicit perceptions, meanings, feelings, reasons and comments. Observation and document gathering will be secondary methods of data collection. Open coding is used for creation of a relationships, models or theory that is "inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon [56, p.23]". The study used the Eisenhardt case study approach with the enfolding literature step to strengthen the results.

Case studies have been used to provide description [31], generate and test theory [23,44]. The goal of this research is to gain a rich description of physician's interactions with EHR, analyze the data and generate relationships or a theory. This study used the seven step Eisenhardt method for building theories from case study research. It is well matched to the open coding analysis selected as the case study process is "highly iterative and tightly linked to the data [17, p. 532]." Participants in the study are physicians selected from Research Medical Center.

Research Design

The research design is interpretive and qualitative. It ensures the data is grounded in real world experience and at the same time allows discovery of new concepts and relationships. Qualitative procedures are used to provide a means for accessing unquantifiable facts about the actual physicians the researcher observes, talks to and interviews. As a result, the qualitative techniques enable the researcher to share in the understandings and perceptions of physicians. The qualitative method developed for this research is appropriate for discovering reasons that describe physicians' interactions with EHR.

There are several reasons why the qualitative methods used in this research enable an examination of the factors that affect physician interaction with EHR: (a) There is a need to collect context-specific measures of job characteristics rather than exclusively relying on context-independent instruments; (b) IS research needs to collect measures, not just the concrete outputs of the system, that show how a system impacts the processes inside an organization; and (c) it is dangerous to over-rely on unidirectional causality relationships between dependent and independent variables because richer insights may be gained by focusing on the complexity of the interrelationships between dependent and independent variables [28]. The qualitative method used in this study provides information that reveals

what physicians think about the quality, meaning, perception and context of EHR interactions.

The examination of the relationship between IT and organizations and people broadens the field of IT; however, this type of research produces added complexity, greater imprecision, the possibility of different interpretations of the same phenomena, and the need to take these issues into account when considering an appropriate research approach [23]. The use of a case study method to discover relationships or to generate theory minimizes these risks. The Eisenhardt method was chosen as it: 1) Generates relationships or theory with constant comparison literature; 2) Emergent theory is likely to be testable with constructs that can be readily measured; 3) High likelihood of valid relationships or theory because the theory building process is tied to data and other evidence.

The qualitative study uses the Eisenhardt research method to produce in-depth descriptions of reasons for physician interaction with EHR. The research strategy focuses on understanding the dynamics present in a setting. The study follows Eisenhardt’s (1989) seven-step approach to research:

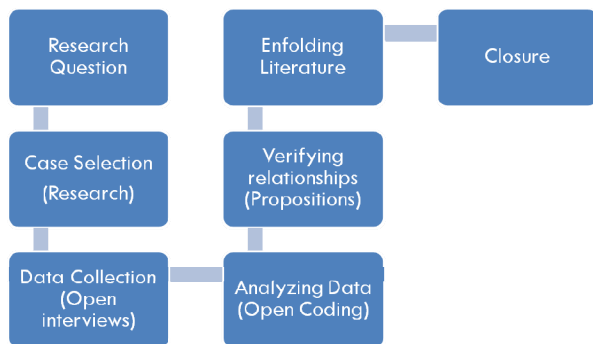


Figure 3: Research Methodology

This approach is consistent with generally accepted approaches to develop relationships or theory from cases (Walsham, 1993; Yin, 1984; Eisenhardt, 1989; Baskerville & Myers, 2004). Eisenhardt’s method complements the open coding approach by providing the ‘enfolded literature’ step. The comparison of the emergent concepts, categories, and theories with conflicting concepts, categories, and theories discussed in the literature produces internal validity, and a comparison of emerging concepts, categories, and theories to similar concepts, categories, and theories discussed in the literature produces generalizability [17]. This process continually builds the researcher’s theoretical sensitivity.

4. Results & analysis

The data for this analysis was comprised of seven physician interviews and represented 66 pages of

electronic transcripts. This data was collected over a period of six months from October 2009 to March 2010. While analyzing the transcripts of the interviews, “labels of meaning” were identified and placed next to the relevant occurrence. Occurrences were events, happenings, actions, feelings, perspectives, actions and interactions. Categorization of the coding was done in two phases. First, the data obtained from the interviews was coded into broad categories. The interview data was analyzed using Strauss & Corbin’s (1998) open coding method. Open coding was used to conceptualize raw data by naming and categorizing the phenomena through close examination of the data. During open coding, data was broken down into discrete parts, closely examined and compared for

Site Selection: Research Medical Center

Unit Analysis: Physician (Patton, 1987)

Physician	Specialty	Age	EHR Usage	Experience (years)	Experience at Research (years)
Barry	ER	53	96	22	15
Brian	ER	31	88	4	4
Harry	OB/GYN	45	44	15	15
Jane	Family Practice	42	62	9	9
Judith	Pediatric/ Internist	39	73	13	13
Steve	Geriatric/ Internist/PAA	62	NA	35	11
Victor	Surgeon	38	65	8	4

Table 1 Physician Description

similarities and differences. The coding process yielded 833 coded quotes. The data representing events, happenings, actions and interactions that were found to be conceptually similar in nature or related in meaning were grouped under abstract concepts that best represent the phenomenon. According to Strauss and Corbin (1998), although events or happenings might be discrete elements, the fact that they share common characteristics or related meanings enables them to be grouped. Based on their ability to explain what is going on, certain concepts were grouped under more abstract higher order concepts which Strauss and Corbin (1998) term category. Categories have analytic power because they can have the potential to explain why physicians may or may not use the technology and potentially predict the effects of certain implementations on physicians’ use. The 833 labels were categorized to compare codes across the interviews. The categories were derived by tabulating the number of occurrences of related concepts.

Reliability of these groupings was achieved through theoretical sensitivity, iterative coding and theoretical sampling. Strauss and Corbin (1998) suggest that theoretical sensitivity is required to enable

the researcher to interpret and define data and thus develop relationships, models or theories that are grounded, conceptually dense and well integrated. Sources of theoretical sensitivity are the literature, professional and personal experiences. Additional reliability was achieved through the iterative use of open and axial coding to bring out the concepts and discover any causal relationships or patterns in the data. Strauss and Corbin (1998, p.98) state that “though open and axial coding are distinct procedures, when the researcher is actually engaged in the analysis he or she alternates between the two modes”. Along with the groupings of abstract concepts (open coding) and identification of causal conditions (axial coding), that lead to the occurrence or development of a phenomenon, additional coding was carried out iteratively using theoretical sampling.

Further reliability was achieved through theoretical sampling, which is the sampling of data on the basis of concepts that have proven theoretical relevance to evolving relationships, models or theories. The form of open sampling used was open sampling which is associated with open coding. Open sampling was used to select additional interview data. The ‘slices of data’ (Urquhart 2009) of all kinds are selected by a process of theoretical sampling, where the researcher decides on analytical grounds where to sample from next. Glaser and Straus (1967, p. 3) state that the researcher does not approach reality as a tabula rasa but must have a perspective that will help him or her abstract significant categories from the data based on the constructs identified in the literature.

This data analysis produced technological, work and social adaptation categories. The numbers of occurrences are shown in the figure below:

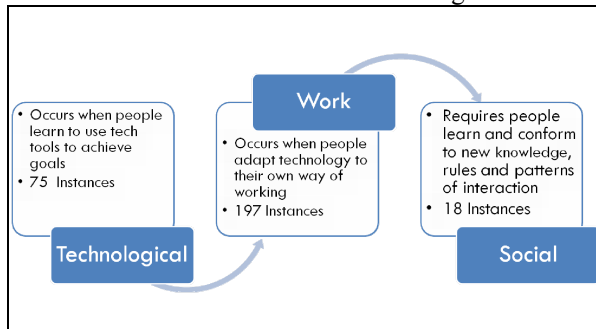


Figure 4: Physician Adaptation Occurrences

A further analysis of adaptation at each of the three levels revealed the level the physicians are able to use EHR to support their work practices, level of technological comfort and social interactions/connections.

Category	Description	Occurrences
Work	The physician perspective of EHR usage on physician work. Subcategories: Positive Work Impact, Negative Work Impact, Productivity.	197
Technological	The Physician perspective on implications of IT Context on EHR usage. Sub-categories: System Development, Hardware & Configuration, Training, Documentation, Desire Integrated Systems, Downtime Concern.	75
Social	The Physician perspective on implications of Social Context on EHR usage.	18
Total		285

Technological adaptation amongst physicians appears to be influenced by their level of comfort and experience with technology. While older physicians are opinion leaders with respect to clinical decisions, younger physicians are frequently leaders in using information technology [1]. This is supported by this research as indicated by the data, such as:

rather than sitting down and thinking “could this be something else, what am I missing, what else could it be?” and we don’t have time to that anymore, you don’t have time to use our clinical skills to take care of our patient. Now, with that being said, we have a whole generation of physicians coming up that are not as good at their clinical skills. I am not as good at my clinical skills as my elder colleagues. They can walk into a room and diagnose something because they were good clinicians.

Now, with that being said, we have a whole generation of physicians coming up that are not as good at their clinical skills. I am not as good at my clinical skills as my elder colleagues. They can walk into a room and diagnose something because they were good clinicians. Now we look at a patient and say what do they have and then we look at the data and make the data fit what we want it to. Does the data fit what it could possibly be rather than I think it’s this, what do I need data-wise to confer? And so I think with EHR we are doing a lot of it, we are spending more time trying to find out what it could be with data rather than talking to a patient.

I think that people that are coming out of training in the last 5 years would have similar thought processes to me on use and benefits of technology. I think that every 10 years you are going to see a generation of different people that even it's just more of who they are and what they do.

I think that the exact opposite...the people that have been here for 20 years and have had a little tough time adapting to, not just new technology, but how fast new technology is updated. The change process and the changes continue to happen...it's a logarithmic progression. Every 5 years the change, I mean, the change we have seen in the last 5 years is exponentially greater than the change we saw in the 5 year period 10-15 years ago. You have to learn to use a new phone and computer every couple of years now.

Research by Qureshi & Noteboom (2004) discovered Digital Immigrants and Digital Natives vary in the approach to technology adaptation and work adaptation. The digital natives frequently complained about the lack of features and usability of the technology tools. This group appeared to be less willing to adapt their work style to the toolset provided. The Digital Immigrants tended to express limited technical expertise and adapted their work to the toolset provided. The Digital Immigrants had much higher levels of work adaptation than the Digital Natives.

According to this research, Digital Natives had lower levels of technological adaptation than Digital Immigrants. They tended to be less willing to adapt to the toolset provided, had higher demands from their toolset and frequently requested additional features. The physicians in this study, primarily Digital Immigrants, clearly have high levels of work adaptation. Work adaptation generated 197 occurrences. The digital immigrants averaged 34 occurrences and the digital natives averaged 22 occurrences. This suggests that the physicians studied in this research support the higher levels of work adaptation by Digital Immigrants. Similar conclusion was made in the research by Anderson (1997), where he reported older physicians are opinion leaders with respect to clinical decisions; younger physicians are frequently leaders in using information technology. As we move forward with the implementation of EHR, this difference has potential to affect future success as the Digital Natives enter the physician roles. This is illustrated in figure 5: Digital Natives Digital Immigrants Process & Infrastructure Model.

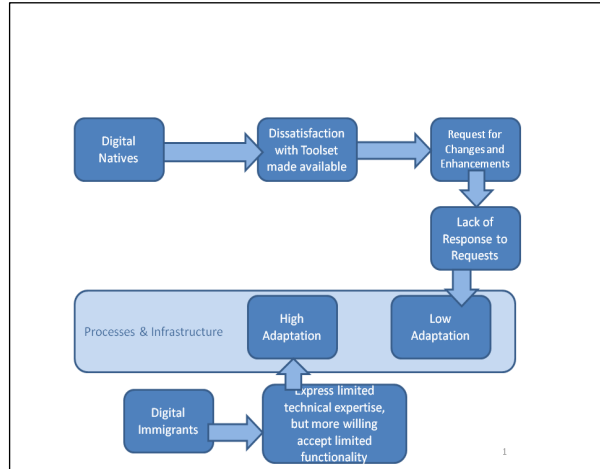


Figure 5 Digital Natives Digital Immigrants Process & Infrastructure Model

In addition, the various processes and infrastructure identified in this research case study do not encourage adaptation. Hence, the frustration amongst physicians and their loss in productivity through the use of EHR exists.

“The major problem with technology is adoption and that most systems are not designed by people who do clinical work.”

“I am not there every day I have trouble navigating that particular system. Plus it is not as user friendly; it doesn't think for you, there is too much information, too many boxes of checkmark data that is not appropriate for patient care.”

“And to make, and it's going to be very hard because we all have different brains and we all see things differently, I am a visual person, so when I see it on one sheet and I see all the information I need it is very easy for me to go through that. But to go through page after page after page after page and it's really only a few hours of time doesn't work for my brain.”

The development of EHR appears to have repeated a common development challenge. The physician perspective of the necessary change is reflected in a seminal Simon quote, “This is an old weakness in engineering design, not peculiar to computers: we are fascinated with our technical capabilities and design sophisticated hammers which go around looking for nails that are shaped so as to be hammerable by them (p. 135).”

Like groupware, EHR appear to be a new technology that is considered additional work resulting in reduced productivity by the physicians required to use it. At the same time, the benefits of using these

technologies have been touted by administrators and politicians.

5. Summary & conclusions

The research employed a qualitative research design to discover reasons of physician interaction with EHR and generate the Digital Natives Digital immigrants Process and Infrastructure Model explaining the categories, constructs and relationships. A case study with open-ended interviews was used to elicit perceptions, meanings, feelings, reasons and comments. Open coding was used for creation of categories, relationships and models that were grounded in real world experience. The research was based on the Eisenhardt approach with the enfolded literature step to increase theoretical sensitivity and to strengthen the results.

The research was guided by lenses created from theories of diffusion, model of e-collaboration effects, technology acceptance theory, physicians as knowledge workers, digital natives and digital immigrants and challenges of learning barriers associated with learning and technology. It was an important area of study to provide insights for discovering physician perspective on interaction with EHR and generating and explaining the categories, constructs and relationships related to physician perspective of EHR. People use systems to meet their particular work needs, or they resist them or fail to use them. EHR can provide some major benefits in direct support of patient care: They are touted as a vast improvement over the paper record in reporting, organizing and locating clinical information. They are touted as an improvement in physicians' decision-making by providing protocols, reminders and alert; and they can be designed to coordinate and manage patient care. Therefore, it is important to understand the physician perspective related to EHR and to understand the major components to be addressed to influence physician adaptation of EHR into their work practices and knowledge processes. This information could help practitioners develop strategies to optimize the interaction with EHR and the study could contribute to the quality of care, quality of data, effectiveness and efficiency gains and patient safety. In addition, the results of the study could guide future attempts to integrate EHR into the fabric of healthcare organizations. Ultimately, it can contribute to improved patient care and safety.

A relevant and interesting direction for future research is expanding the focus on the influence of digital immigrants and digital natives on technology adaptation. As the focus of information technology continues to support many professional domains, the

number of digital natives will continue to change the demographics of many professional work groups. Research to provide insight in this area would be beneficial.

Practice needs to consider the potential influence of digital natives and digital immigrants and their representation in the workplace. Research has indicated a difference in their adaptation of technology. With the changing demographics of the workplace, this will become a more important issue for practice. In addition, exploring the subcategories of infrastructure and processes provides opportunity to improve these areas.

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