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Do Perceptions of An Organizing Vision Influence Physicians Assimilation of Electronic Medical Records'

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Abstract

Heathcare policy makers look to information technologies (IT) to play a key role in addressing problematic issues such as access, cost, and quality. High expectations for solutions that IT might bring to healthcare along with government mandates, increased funding for IT initiatives, and dramatic expansion of IT capabilities are stimulating ambitious projects in a variety of settings, especially with electronic medical records (EMRs). Numerous intelligent foresights abound for applying EMRs, but uncertainties about benefits have also been raised. In this paper, we examine how a community-wide discourse affects the assimilation of EMRs. Using the theoretic concepts of an organizing vision (that distills insight, intuition, and knowledge) and organizational learning (that describes potential ability to perform) we conduct an analysis on a mailed survey of small independent physician practices to assess the scale of assimilation of EMRs based on perceptions of an organizing vision. Our research contributes to bridging the gap between theory and practice by examining how an organizing vision helps shape organizational implementation and adoption decisions of a complex health IT innovation.

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Keywords

Organizing Vision, Organizational Learning, Electronic Medical Record, Adoption, Assimilation

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Introduction

Healthcare spending accounts for a substantial and growing portion of the gross domestic product in many countries e.g., 14% in America and 8%, on average, for 30 countries in the Organization for Economic Cooperation and Development (Anderson 2006). Along with escalating costs and increased demand for services, policy makers, and healthcare leaders are faced with the challenge of improving access to and quality of services. Increasingly, policy makers look to information technologies (IT) to play an important role in addressing these issues. High expectations for the benefits that IT might bring to healthcare, government mandates and funding for IT initiatives, and dramatic expansion of IT capabilities (e.g., the Internet) are stimulating ambitious IT projects in a variety of settings (Chin 2004; Landro 2004). This is true despite limited verifiable evidence of widespread economic value of healthcare IT (HIT) along with substantial barriers to successful adoption and assimilation (Bodenheimer & Grumbach 2003; Skinner 2003; Birkmeyer et al. 2002; Fichman & Kemerer 1997).

With heightened interest and investment in HIT, a variety of IT innovations have developed to address issues such as access, cost, and quality. In this paper we use the term organizing vision (OV) (Swanson & Ramiller 1997) to characterize these IT innovations. An OV is a focal community idea for the application of IT in organizations. This focal community coalesces in the inter-organizational field. As such the OV becomes the community's vision for organizing in a way that embeds and utilizes new IT in organizational structures and processes. The concept of an OV helps to explain how information system innovations originate, develop, and diffuse over time, across firms and industries. This vision serves key functions in interpretation, legitimation, and the organization and mobilization of economic roles and exchanges. In essence, a community's discourse serves as the developmental engine for an OV. Within this community additional factors such as business commerce, the IS practitioners' world view, the motivating business problematic, the core technology, and material processes of adoption and diffusion help to provide the discourse with its content, structure, motivation, and direction.

A key aspect of an OV is that it has a "career" over which it varies substantially in visibility, prominence, and influence. Even as an OV helps shape how managers think about the future application and practice in their field, the OV struggles to achieve ascendancy in the community. An OV incorporates not only IT but also assumptions about practices and institutions that can take advantage of IT capabilities. For example, "visions" for telemedicine suggest how information and communication technologies can facilitate collaboration among geographically separated experts, bring medical expertise to patients in remote locations, enable home monitoring of elderly, and so on. In addition, the OV for computerized clinical ordering systems incorporates ideas about coordinated clinical care, reduced medical errors, and improved compliance to clinical standards and guidelines.

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In addition, an OV facilitates community members' interpretations of the social and organizational implications of an IT innovation, legitimizes its diffusion and adoption, and mobilizes resources in support of the innovation (Swanson & Ramiller 1997). OVs for HIT can even stimulate interest and investment in IT, despite uncertainties about costs and benefits. Yet, as the healthcare industry has gained experience with IT, some stakeholders have raised concerns about costs and institutional barriers that hinder successful IT implementations (Hersh 2004; McDonald 1997). Others have questioned the unilateral expectation that IT use in healthcare will improve quality (Bodenheimer & Grumbach 2003; Bates et al. 2003). Conflicting goals and priorities among various healthcare stakeholders have also become evident (Middleton et al. 2005; Ash & Bates 2005). As IT OVs take shape and evolve beliefs about how IT use in healthcare can address access, cost, and quality issues in the face of substantial economic, social, and institutional barriers are debated in a number of discourse forums. For example, surveys were conducted to assess the rate and distribution of EMR adoption among physicians in ancillary healthcare settings (Simon et al. 2007; Burt et al. 2007; Menachemi 2006; Gans et al. 2005; Andrews et al. 2004; Audet et al. 2004). These surveys indicate that although some variation in EMR adoption is attributable to variables such as medical specialty, region, practice location, physician age, and gender, nonetheless practice size consistently emerged as a key differentiator between adopters and non-adopters (Grossman & Reed 206; Burt and Sisk 2005; Gans et al. 2005). This apparent gap in adoption rates is not surprising because large organizations are in general more likely to adopt innovations (Rogers 1995). This is important because gaps in adoption rates are particularly problematic given the importance of small physician practices in the U.S. healthcare system and policy makers' goals for HIT use across a wide range of healthcare venues (WHSOU 2004).

To address the issue of gaps in adoption rates we introduce the concept of organizational learning. That is, citing work by Attewell (1992), Fichman and Kemerer (1997, p. 1346) define complex organizational technologies as "technologies, that, when first introduced, impose a substantial burden on would-be adopters in terms of the knowledge needed to use them effectively." This description is clearly true of EMRs and physician practices (Miller et al. 2003). In addition, Gans et al. (2005, p. 1331) noted, "the transition from computer-based administrative information systems to fully implemented EHRs is a major undertaking that creates dislocation among the clinical staff and is more complicated, more difficult, and more expensive than we or most practices expected. The majority of practices are finding the transition difficult even if the physicians and nurses are fully supportive."

To account for the organizational impact of EMRs and the complexity of this process improvement innovation we considered small physician practices as micro-sized organizations and examined how perceptions of an OV might influence the assimilation of EMRs. To illustrate, taking Attewell's (1992) macro-level approach to the organizational level of analysis, Fichman and Kemerer (1997) focused on complex organizational technologies and organizational characteristics associated with the adoption of such technologies. They posited that examining differences in organizational learning barriers across

organizations could help predict which organizations have a greater propensity to initiate and sustain the assimilation of complex organizational IT, in their case software process innovations (SPIs). They hypothesized that organizations that have a greater scale of activities over which learning costs can be spread (learning-related scale), more extensive existing knowledge related to the focal innovation (related knowledge), and a greater diversity of technical knowledge and activities (diversity) are more likely to assimilate complex organizational technologies. Fichman and Kemerer further demonstrated these relationships in an empirical study of the assimilation of an SPI (object oriented development technologies). This is important because whereas their study showed a high correlation between these characteristics and organizational size, that is, larger organizations could more easily overcome learning barriers than smaller organizations this study specifically addresses the small organization (independent physician practice). Given the discussion of OVs and organizational learning, Figure 1 depicts the research model for this study.

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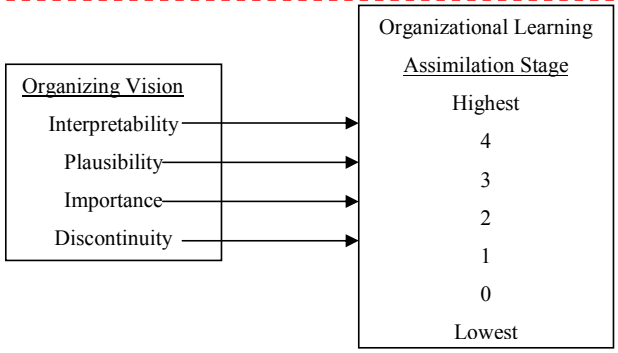

Figure 1. Research Model.

In terms of Organizational Learning, *Assimilation Stage* reflects the earliness of initiation of assimilation activities, speed of assimilation activities, and an absence of rejection, stalling, or discontinuance (Meyers & Goes 1988). Following Fichman and Kemerer's (1997) approach, we assessed assimilation stages in terms of a practice's movement towards the use of an EMR as follows: 0) awareness i.e., either not aware or aware but not interested in using 1) interested in using 2) pursuing i.e., actively evaluating, vendor chosen, or piloting, 3) limited implementation, and 4) fully implemented (see Table 2). In terms of the Organizing Vision variables (see Table 3), *Interpretability* reflects how intelligible and informative representations of the OV become in its associated public discourse. In addition, Interpretability revolves around such aspects as clarity, consistency, richness, and balance. *Plausibility* focuses on distortions in the discourse, emphasizing in particular the burdening of the OV with misunderstandings, exaggerations, and misplaced claims. Items contributing to plausibility are suggestive, on one hand, of honest confusion and basic lack of knowledge and, on the other hand, of the calculative and even deceptive exploitation of the OV. *Importance* brings together a diverse set of judgments. That is, importance implies the power of influencing or the quality of having evident value either generally or in a particular relation and often by merely

existing. *Discontinuity* consists of two related concepts: conceptual discontinuity i.e., how great a conceptual departure does the OV pose and structural discontinuity i.e., how much difficulty is actually entailed in implementing the innovation. These constructs are important because a factor analysis and an ordinal regression are applied with the OV independent variables to predict the organizational learning dependent variable assimilation stage with respect to small physician practices and EMRs.

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Research Methodology

To test for assimilation of EMRs among small physician practices based on perceptions of an OV, a mailed survey was administered following procedures outlined in Dillman (2000). A mailing list for an independent physicians association with approximately 780 physicians was used. The endorsement and sponsorship of the survey by the association's leadership helped ensure a good response rate, as physicians are typically non-responsive to surveys (Olson 1993). Our unit of analysis is the practice organization. The 780 physicians were grouped into 567 practices (organizations). Table 1 summarizes response rate information for the survey and highlights key demographic information.

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Table 1. Response rate, survey, and practice location statistics

Response Rate	Number	Percent	Survey	Number	Percent	Location	Percent
Not returned	296	52%	Returned & complete	182	32%	Urban	8%
Return to sender	37	7%	Eliminated from survey	32*	6%	Suburban	23%
Returned with no replies	52	9%	Total used in survey	150	26%	Rural	69%
Returned & complete	182	32%				Total	100%
Total	567	100%					

*Due to length and complexity of the survey, some surveys contained missing data for some questions and were discarded.

To develop measures of each construct, we applied successive stages of theoretical modeling, statistical testing, and refinement (Straub 1989; Zhu 2003). We developed measurement items on the basis of a comprehensive literature review along with interviews with subject matter experts. We also utilized descriptive questions from other surveys were possible. The questions covering the dependent variable of assimilation stage were organized into five groups (0 through 4) for ordinal regression. That is, categories with small numbers were combined to facilitate the analysis i.e., if two adjacent categories are collapsed into one larger category only a small change is made and models built using the old and new categorizations should produce similar results (SPSS 2005). We thus grouped respondents into categories based on awareness (not aware vs. aware but not interested in using), interest, pursuit (actively evaluating, vendor chosen, piloting), limited implementation, and fully implemented (see Table 2).

Table 2. Dependent variable ordinal categories

Group	Count	Percent	Questions
0	2	1%	Not aware of EMR technology
	43	29%	Aware of EMR technology but not interested in using it at this time
	45	30%	
1	37	25%	Interested in evaluating an EMR in the next twelve months
2	11	7%	Actively evaluating an EMR now, e.g., vendor demonstrations, etc.
	6	4%	Have decided to implement an EMR and have chosen a vendor
	2	1%	Piloting or using an EMR on a trial basis
	19	13%	
3	12	8%	In early stage of EMR implementation, i.e., some training, limited features in use, and limited deployment throughout the practice
4	37	25%	Have implemented many of an EMR's capabilities throughout the practice
Total	150	100%	

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Table 3. Independent variables used in the ordinal regression

Variable	Description
Interpretability	How intelligible and informative are representations of the OV in its associated public discourse.
Plausibility	Distortions in the discourse, emphasizing in particular the burdening of the OV with misunderstandings, exaggerations, and misplaced claims.
Importance	Implies power to influence; or the quality of having evident value either generally or in a particular relation and often by merely existing.
Discontinuity	How great a conceptual departure does the OV pose and how much difficulty entailed in implementing the OV.

Factor Analysis and Ordinal Regression

Prior to running an ordinal regression a Confirmatory Factor Analysis (CFA) was run with four factors based on the eighteen survey questions comprising the OV portion of the survey. Confirmatory factor analysis involves the specification and estimation of one or more putative models of factor structure (Comrey & Lee 1992). Each of these models that are commonly put forth or accepted as true on inconclusive grounds propose a set of latent variables, or factors, that account for covariances among a set of observed variables. CFA requires *a priori* designation of plausible factor patterns from previous theoretical or empirical work. These plausible alternative models are then explicitly tested statistically against sample data. As such, following prior exploratory factor analysis work of Ramiller and Swanson (2003) and using communality estimates of one, a principal axis factor analysis was run using SPSS (version 14) to determine the legitimacy of the underlying structure of the OV model based on the eighteen OV items. After the initial factor analysis was run and model structure confirmed, eight (8) OV questions that did not meet a threshold level of 0.400 or above were eliminated and the factor analysis was re-run. This was accomplished to distill the dataset until an almost factor pure model was obtained. With

respect to the factor analysis, model functions of Anti-image, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (.775), Bartlett's test of sphericity (approx. Chi-Square=519.826, df=45, Sig.=.000), principal axis factoring, Varimax for the group method, extraction communalities, and Cronbach's Alpha (.528) were statistically acceptable; and, Scree plots confirmed the choice of four components. Table 4 illustrates the distilled factor analysis model. This model indicates OV question 2 relating to Interpretability correlates with Factor 4; OV questions 6 and 7 relating to Plausibility correlate with Factor 3; OV questions 8, 9, 10, 12, and 14 relating to Importance correlate with Factor 1; and, OV questions 16 and 17 correlate with Factor 2.

Table 4. Rotated Factor Matrix

	Factors				
OV Question	**F1**	**F2**	**F3**	**F4**	**OV Construct**
2. Finding a good balance of information on the pros and cons of EMRs is difficult. [rc]	-0.065	-0.085	0.266	**0.497**	**Interpretability**
6. A lot of what I've heard about EMRs seems like exaggerated claims. [rc]	0.126	-0.255	**0.569**	0.153	**Plausibility**
7. What EMRs really consist of is widely debated. [rc]	0.054	-0.286	**0.655**	0.184	
8. EMRs offer a tremendous opportunity to deliver value to a practice.	**0.873**	-0.313	-0.068	0.074	**Importance**
9. EMRs make doable some wonderful things that were previously only dreamed of.	**0.828**	-0.012	-0.007	0.073	
10. A practice that waits too long to use an EMR is going to fall behind its peers.	**0.702**	-0.026	0.175	-0.176	
12. EMRs are solutions that have found the right problems to solve.	**0.668**	-0.143	0.232	0.109	
14. The health care market still has a considerable interest in EMRs.	**0.511**	0.103	-0.015	-0.187	
16. EMRs seem to require some kind of health information technology wizard to get it all to work out. [rc]	0.037	**0.749**	-0.335	-0.018	**Discontinuity**
17. Using EMRs basically turns a private practice upside down.	-0.166	**0.686**	-0.211	-0.126	

[rc]: item reversed coded for factor analysis
Extraction: Principal Axis Factoring
Rotation: Varimax, Kaiser Normalization.
Rotation converged in 6 iterations.

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After the factor analysis was complete, ordinal regression was run on the four factors of the distilled dataset against the assimilation stage. Although several link functions (software option to run an ordinal regression) are available in SPSS (the statistical software package used for this analysis) such as Cauchit, Complementary Log-log, Logit, Negative Log-log, and Probit, the Cauchit link function was chosen. That is, ordinarily, the Negative Log-log link function is the statistical logical best choice when the cumulative probability for lower scores (on the dependent variable) is high and the approach to 1 is slow (Norusis 2005). In this study the cumulative probabilities of the dependent variable distribute with a decreasing trend from high to low with the first four categories then spikes up for the last category e.g., 32%, 25%, 11%, 7%, and 25%, respectively. Given this distribution of the dependent variable and even though the Negative Log-log might appear the logical best choice we found the Cauchit Link function worked best at describing the model.

Findings

Table 5 provides descriptive statistics and correlations for the OV questions and assimilation stage. The average category for assimilation stage was 2 (rounded) which corresponds to individual replies of actively evaluating, decided to implement, piloting, or otherwise using an EMR on a trial basis. Ordinal regression model fitting information is consolidated into Table 6 and consists of: -2 log-likelihood values for the intercept only (baseline) and final models (McCullagh and Nelder, 1989); two goodness-of-fit statistics, the Pearson's chi-square statistic and another chi-square statistic based on the deviance; three pseudo r-square measures: Cox and Snell's (Cox and Snell, 1989), Nagelkerke (Nagelkerke, 1991), and McFadden's (McFadden, 1974); and, tests of parallel lines. All of these model fitting results were statistically acceptable for this dataset.

Table 5. Descriptive Statistics and Correlations

	Mean	*SD*	*Assim*	*2*	*6*	*7*	*8*	*9*	*10*	*12*	*14*	*16*	*17*
Assim	2	1.57	1										
2	3	1.57	-0.026	1									
6	3	1.42	0.199	0.252	1								
7	4	1.35	0.162	0.282	0.472	1							
8	5	1.72	0.355	-0.003	0.179	0.077	1						
9	5	1.54	0.222	-0.020	0.108	0.065	0.726	1					
10	4	1.74	0.302	-0.088	0.175	0.139	0.633	0.546	1				
12	4	1.38	0.141	0.078	0.268	0.258	0.618	0.568	0.477	1			
14	5	1.14	0.152	-0.140	-0.006	-0.054	0.368	0.436	0.382	0.317	1		
16	4	1.63	-0.273	-0.166	-0.414	-0.409	-0.185	0.026	-0.043	-0.155	0.093	1	
17	4	1.58	-0.213	-0.158	-0.292	-0.407	-0.349	-0.163	-0.134	-0.281	0.007	0.581	1

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Table 6. Ordinal regression model fitting information with Cauchit Link Function

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	453.262			
Final	416.28	36.982	4	0.000
Test of Parallel Lines*				
Model				
Null Hypothesis	416.28			
General	402.075	14.205	12	0.288
Goodness-of-Fit				
Pearson		700.659	588	0.001
Deviance		414.894	588	1.000
Pseudo R-Square	Pseudo R-Square			
Cox and Snell	0.219			
Nagelkerke	0.230			
McFadden	0.081			

*The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

Table 7 shows the ordinal regression parameter estimates for this study. As Table 7 indicates, the model predicts outcomes for the OV constructs of Importance (estimate +.895, p<.01) and Discontinuity (estimate -.751, p<.01). The model does not predict outcomes for the OV constructs of Interpretability (estimate -.216, Sig.=.389) and Plausibility (estimate +.146, Sig.=.436). In addition, the signs of the coefficients (estimate) give important insights into the effects of the predictors in this model such that the signs essentially indicate the direction of the effect. That is, the positive coefficient for Importance (estimate +.895) indicates that as small physician practices find EMRs more important then it is more likely that the small physician practice will fall into a higher assimilation category. On the other hand, the negative coefficient for Discontinuity (estimate -.751) indicates that the greater the conceptual departure an OV of EMRs poses and the greater the difficulty entailed in actually implementing an EMR then the more likely the practice would fall into a lower category of assimilation.

Table 7. Ordinal regression parameter estimates

Parameter Estimates						
	Estimate	Std. Error	Wald	df	**Sig.**	
Threshold						Assimilation Scale
[0]	-0.942	0.214	19.363	1	0	
[1]	0.335	0.162	4.274	1	0.039	
[2]	0.908	0.199	20.834	1	0.000	
[3]	1.383	0.248	31.101	1	0.000	
Location						**OV Construct**
Factor 1	**0.895**	0.199	20.222	1	**0.000**	**Importance**
Factor 2	**-0.751**	0.198	14.338	1	**0.000**	**Discontinuity**
Factor 3	0.146	0.188	0.606	1	0.436	Plausibility
Factor 4	-0.216	0.251	0.741	1	0.389	Interpretability

Link function: Cauchit

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Analysis, Interpretation, and Discussion

Descriptive studies are useful in assessing the overall rate of EMR adoption and in highlighting the types of physician organizations that may need special attention; but, these studies provide limited explanations for why gaps develop or persist and they lack predictive analysis. For example, in a systematic review of HIT related articles, Chaudry et al. (2006) found that only 13 out of 257 articles dealt with a predictive analysis. Moreover, studies of HIT generally have examined large organizations such as hospitals (Garets & Davis 2006; Ash et al. 2002; Doolan & Bates 2002) or perceptions and use of HIT at the individual-level (Dykes 2006; Blumenthal et al. 2006). Little research attention has been given to small physician practices, particularly at the organizational level of analysis. Studying EMRs at the organizational level of analysis could help improve our understanding of HIT assimilation because EMRs are a type of complex organizational technology. This is important because in this study we attempted to improve on the understanding of HIT assimilation by separating two not so abstract entities into their constituent elements. That is, using the constructs of interpretability, plausibility, importance, and discontinuity, a diverse, inter-organizational community creates an organizing vision of an information system innovation through a community-wide discourse, and this vision is important to its early, as well as later, diffusion. The factor analysis and ordinal regression conducted here indicate that two of the four OV constructs i.e., importance and discontinuity, clearly contribute to the organizational learning construct of assimilation of EMRs by small independent physician practices. That is, the OV construct of importance has a positive effect on assimilation in that as the OV increases with respect to how important EMRs are perceived, then the higher on the organizational learning scale a small physician practice would falls. Likewise, the OV construct of discontinuity has a negative effect on assimilation in that as the OV increases with respect to how great a conceptual departure or how difficult actually implementing an EMR is perceived, then the lower on the organizational learning scale a small physician practice falls. This is important for both theoretical and practical reasons. From a theoretical perspective, further research is indicated to understand why only two of four OV constructs were found significant. Perhaps question construction i.e., wording, sample size, or some other variable may require further study to determine the validity and generalizability of the OV model with respect to the adoption and assimilation of EMRs. From a practical perspective, the results of this study can provide invaluable support to the small independent physician practice when addressing the issue of adoption and use of an EMR. That is, if those stakeholders who want to promote EMR adoption and use, such as policy makers, government officials, professional associations, and healthcare organizations, understand how physicians perceive EMRs with respect to importance and discontinuity, then those stakeholders could better tailor policies to facilitate adoption and assimilation of EMRs by small physician practices and thus contribute to the goal of all Americans using EMRs by the year 2014 (WHSOU 2004).

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Limitations

Dillman (2000) cites four sources of potential survey error: measurement, sampling, coverage, and nonresponse. Measurement error is the result of poor question wording or questions presented in a way that either inaccurate or un-interpretable answers are obtained. By obtaining feedback on survey questions from professionals in the field such as physicians and other healthcare personnel we believe the potential for measurement error, although not eliminated, has been reduced. Other errors are related to the ability to generalize a statistical sample to a population. Sampling error is the result of surveying only some, but not all, elements of the survey population. Coverage error is the result of not allowing all members of the survey population to have an equal or known nonzero chance of being sampled for participation in the survey. Non-response error is the result of individuals who respond to the survey who are different from sampled individuals who did not respond, in a way relevant to the study. We attempted to minimize these issues by following standard survey protocols for initial mailings and follow-up reminders (Dillman, 2000). Of note, the goal in this research was not to produce a representative sample of physicians, rather our goal was to develop and test a theoretically-informed model to help explain variations in EMR assimilation among small practices.

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Conclusion

Our research attempted to bridge the gap between theory and practice by examining how an organizing vision helps shape organizational implementation decisions of a complex health IT innovation—an electronic medical record. For academics, extending organizing visions (Swanson & Ramiller 1997) and organizational learning (Fichman & Kemerer 1997) helps to propagate basic knowledge into a new research space (Berthon et al. 2002). To illustrate, this research examined the effectiveness of extending two theoretical models by using a relatively complex organizational information technology (EMR). In addition, this research tested those two theoretical models in a highly differentiated institutional context (healthcare). Finally, this research evaluated the applicability of applying those two theoretical models in an organizational setting (small organizations i.e., independent physician practices) that traditionally has received little attention. For practitioners, this research provides an analysis at a level that should prove useful from a managerial decision making perspective. That is, as outlined above, most prior studies of EMRs have dealt either with plain descriptive measures or with large organizations i.e., hospitals and other healthcare institutions, or with individuals. For example, prior research has tended to summarize basic frequencies of use or restricted the domain of investigation to institutional settings or individual users. In contrast, this research identifies specific perceptions and at a level that any independent physician practice would find useful when faced with the decision to adopt and use an EMR.

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References

Anderson, G. F., Frogner, B. K., Johns, R. A., and Reinhardt, U.E. "Health Care Spending and Use Of Information Technology in OECD Countries," Health Affairs (25:3), 2006, pp. 819-831.

Andrews, J. E., Pearce, K. A., Sydney, C., Ireson, C., and Love, M. "Current State of Information Technology Use in a US Primary Care Practice-Based Research Network," Informatics in Primary Care (12:1), 2004, pp. 11-8.

Ash, J. S. and Bates, D. W. "Factors and Forces Affecting EHR System Adoption: Report of A 2004 ACMI discussion," Journal of the American Medical Informatics Association. 12(1), 2005, pp. 8-12.

Ash, J. S., Gorman, P. N., Seshadri, V. and Hersh, W. R. "Computerized Physician Order Entry in U.S. Hospitals: Results of A 2002 Survey," Journal of the American Medical Informatics Association (11), 2002, pp. 95-99.

Attewell, P. "Technology Diffusion and Organizational Learning: the Case of Business Computing," Organization Science (3:1), 1992, pp. 1-19.

Audet, A. M., Doty, M., Peugh, J., Shamasdin, J., Zapert, K., and Schoenbaum, S. "Information Technologies: When Will They Make it Into Physicians' Black Bags?" Medscape General Medicine, Commonwealth Fund Pub. #799, 2004.

Bates, D. W., Ebell, M., Gotlieb, E., Zapp, J., and Mullins, H. C. 2003. "A Proposal for Electronic Medical Records in U.S. Primary Care," Journal of the American Medical Informatics Association, (10:1), pp.1-10.

Birkmeyer, C. M., Lee, J., Bates, D. W., and Birkmeyer, J. D. "Will Electronic Order Entry Reduce Health Care Costs?" Effective Clinical Practice, American College of Physicians, 2002.

Blumenthal, D., Desroches, C., Donelan, K., Ferris, T., Ashish, J., Kaushal, R., Rao, S., and Rosenbaum, S. Health Information Technology in the United States: The Information Base for Progress. Robert Wood Johnson Foundation, 2006.

Bodenheimer, T. and Grumbach, K. "Electronic Technology – A Spark to Revitalize Primary Care?" Journal of the American Medical Association, (290:2), 2003, pp. 259-264.

Burt, C. W., Hing, E., and Woodwell, D. " Electronic Medical Record Use by Office-Based Physicians: United States, 2005" U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, Hyattsville, MD, 2007.
{accessed at: http://www.cdc.gov/nchs/products/pubs/pubd/hestats/electronic/electronic.htm, Feb 27, 2007}

Comrey, A.L. and Lee, H.B. A first course in factor analysis. 2nd Edition, Lawrence Erlbaum Associates, Publishers, 1992.

Dillman, D. Mail and Internet Surveys – The Tailored Design Method. 2nd Edition, John Wiley & Sons, Inc., New York, 2000.

Doolan, D. F. and Bates, D. W. "Computerized Physician Order Entry Systems in Hospitals: Mandates and Incentives," Health Affairs, (21:4), 2002, pp. 180-188.

Dykes, P. The Impact of Health Information Technology on the Role of Nurses & Interdisciplinary Communication Final Results/Findings - Survey Result (3/1/2006). Healthcare Information and Management Systems Society Analytics, LLC, Chicago, IL, 2006 {accessed at: http://www.himss.org/ASP/ContentRedirector.asp?ContentID=65652, Feb 27, 2007}

Fichman, R. G. and Kemerer, C. F. "The Assimilation of Software Process Innovations: An Organizational Learning Perspective," Management Science, (43:10), 1997, pp. 1345-1363.

Gans, D., Kralewski, J., Hammons, T. and Dowd, B. "Medical Groups' Adoption of Electronic Health Records and Information Systems," Health Affairs, (24:5), 2005, pp. 1323-1333.

Garets, D. and Daves, M. Electronic Medical Records vs. Electronic Health Records: Yes, There is a Difference. Healthcare Information and Management Systems Society Analytics, LLC, Chicago, IL, 2006. {accessed at: http://www.himssanalytics.org/docs/WP_EMR_EHR.pdf, Feb 27, 2007}

Grossman, J. and Reed, M. Clinical Information Technology Gaps Persist Among Physicians. Center for Studying Health System Change, Issue Brief No. 106, 2006.

Hersh, W. "Health Care Information Technology - Progress and Barriers," Journal of the American Medical Association, (292:18), 2004, pp. 2273-2274.

McDonald, C. J. "The Barriers to Electronic Medical Record Systems and How to Overcome Them," Journal of the American Medical Informatics Association, (4:3), 1997, pp. 213-221.

Menachemi, N. and Brooks, R. G. "EHR and Other IT Adoption Among Physicians: Results of a Large-Scale Statewide Analysis," Journal of Healthcare Information Management, (20:3), 2006, pp. 79-87.

Meyers, A. D. and Goes, J. B. "Organizational Assimilation of Innovations – A Multilevel Contextual Analysis," Academy of Management Journal, (31:4), 1988, pp. 897-923.

Middleton, B., Hammond, W. E., Brennan, P. F., and Cooper, G. F. "Accelerating U.S. EHR Adoption: How to Get there from Here. Recommendations Based on the 2004 ACMI Retreat," Journal of the American Medical Informatics Association, (12:1), 2005, pp. 13-19.

Miller, R. H., Sim, I., and Newman, J. Electronic Medical Records: Lessons from Small Physician Practices. California Healthcare Foundation, 2003. {accessed at: http://www.chcf.org/documents/ihealth/EMRLessonsSmallPhyscianPractices.pdf, Feb 27, 2007}

Nagelkerke, N. "A Note on the General Definition of the Coefficient of Determination," Biometrika, (78:3), 1991, pp. 691-692.

Norusis, M. J. SPSS 14.0 Advanced Statistical Procedures Companion. Prentice Hall, New Jersey, 2005.

Olson, L., Schneiderman, M. and Armstrong, R. "Increasing Physician Survey Response Rates Without Biasing Survey Results," Proceedings, SRMS, American Statistical Association, 1993, p. 1036.

Ramiller, N. C. and Swanson, E. B. "Organizing Visions for Information Technology and the I.S. Executive Response," Journal of Management Information Systems, (20:1), 2003, pp. 13-50.

Rogers, E. M. Diffusion of Innovations (4th Ed.). New York: The Free Press, 1995.

Simon, S. R., Kaushal, R., Cleary, P. D., Jenter, C. A., Volk, L. A., Poon, E. G., Orav, E. J., Loc, H. G., Williams, D. H., and Bates, D. W. "Correlates of Electronic Health Record Adoption in Office Practices: A Statewide Survey," Journal of the American Medical Informatics Association, (14), 2007, pp. 110-117.

Skinner, R.I. "The Value of Information Technology in Healthcare," Frontiers of Health Services Management, (19:3), 2003, pp. 3-15.

SPSS 14.0 SPSS Inc., Chicago, Illinois, 2005.

Straub, D. W. "Validating instruments in MIS research," MIS Quarterly, (13:2), 1989, pp. 36-49.

Swanson, E. B. and Ramiller, N. C. "Innovating Mindfully with Information Technology," Management Information Systems Quarterly, (28:4), 2004, pp. 553-583.

Swanson, E. B. and Ramiller, N. C. "The Organizing Vision in Information Systems Innovation," Organization Science, (8:5), 1997, pp. 458-474.

WHSOU - White House State of the Union (2004). {accessed at: http://www.whitehouse.gov/stateoftheunion/2004, February 27, 2007}

Zhu, K., Kraemer, K., and Xu, S. "Electronic Business Adoption by European Firms: A Cross-Country Assessment of the Facilitators and Inhibitors," European Journal of Information Systems, (12), 2003, pp. 251-268.

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