

Interorganization al Health Care Systems Implementations: An Exploratory Study of Early Electronic Commerce Initiatives

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Changing business practices, customers needs, and market dynamics have driven many organizations to implement interorganizational systems (IOSs). IOSs have been successfully implemented in the banking, cotton, airline, and consumer-goods industries, and recently attention has turned to the health care industry. This article describes an exploratory study of healthcare IOS implementations based on the voluntary community health information network (CHIN) model.

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In recent years, interorganizational systems (IOSs) have emerged as a key technology in a number of industries. Starting with reservation systems in the airline industry (e.g., the SABRE system), IOSs have been used to implement strategy and gain competitive advantage in the cotton, hospital supply, consumer-goods retailing, and automotive industries, among others.

It has been suggested that the health care industry, too, can benefit from the implementation of IOSs. One frequently mentioned model for health care IOS is the community health information network (CHIN). CHINs have been defined as:

Interorganizational systems using information technology(ies) and telecommunications to store, transmit, and transform clinical and financial information. This information can be shared among cooperative and competitive participants, such as payers, hospitals, alternative delivery systems, clinics, physicians, and home health agencies.¹

CHINs enable multiple organizations to share health services data in order to meet common objective(s), ranging from profit maximization to improvement of public health conditions and wellness. Furthermore, CHINs can provide a myriad of services from electronic transaction processing to telephone-based referral information.

CHINs are a recent phenomenon, and there is not yet much research available on these systems, their development, or their implementation. In the exploratory study on which this article is based, we have chosen to focus on CHIN implementation, asking what conditions are necessary to ensure success in CHIN implementations. In attempting to answer this question, we can turn to the IOS literature, but we must recognize that CHINs may differ in significant ways from existing IOSs in other industries.²⁻⁵

The objective of this study is to examine the CHIN implementation process in order to determine if existing organizational implementation models can ade-

Key words:

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quately describe implementation in this IOS context. Given the fairly recent emergence of the voluntary CHIN concept, this research is exploratory and seeks to establish a foundation upon which future studies can build.

THE RESEARCH MODEL

The literature has developed the view of implementation as a sustained organizational effort to introduce and diffuse a technology across a user community,⁶ typically within a single organization. Implementation research has generally followed one of two approaches: the factor study or the process approach. Though factor studies have uncovered many critical attributes of system implementation situations, they do not provide an understanding of implementation dynamics, of how these factors interact and change over the course of an implementation. Process studies focus on the dynamics of implementation, but generally do this without considering the contextual factors. A broader perspective combining the strengths of both strategies has been shown to shed more light on actual implementation experience.⁷

Cooper and Zmud⁶ adopted a diffusion process model of (information technology) IT implementation and modified it to include some of the factors affecting implementation, thereby capturing both the process dynamics and its context. The stages and processes in

As the degree of information sharing among interorganizational participants increased, the quality of information available was also expected to increase, thereby fostering successful implementation.

Cooper and Zmud's model are outlined in Table 1. Cooper and Zmud suggest that the process model can be used as a framework for understanding how critical implementation factors evolve over the course of implementation. The Cooper and Zmud model is more parsimonious than other models that attempt to integrate both of these dimensions,⁷ and it has been empirically validated.⁶ Consequently, we have taken the Cooper and Zmud diffusion framework and adapted it to examine CHIN implementation.

Our proposed CHIN implementation model is shown in Figure 1. Cooper and Zmud identify five broad contextual factors that might impact the implementation process: user, organization, task, technology, and environment. Their description of the implementation process, however, suggests an alternative clustering of contextual variables. For instance, in the initiation stage they state that "pressure to change

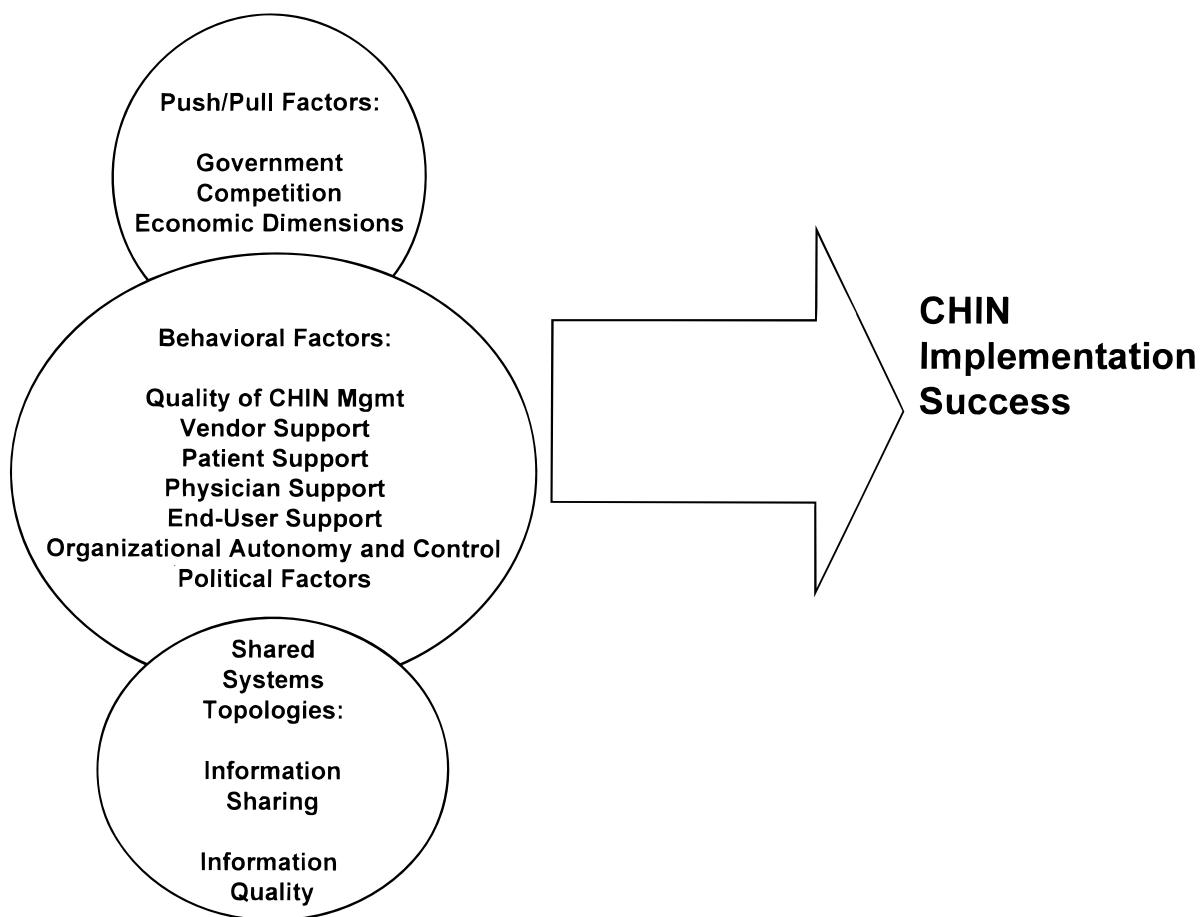
TABLE 1

IT IMPLEMENTATION PROCESS MODEL

Stages	Process
Initiation	Active and/or passive scanning of organizational problems/opportunities and IT solutions are undertaken. Pressure to change evolves from either organizational need (pull), technological innovation (push), or both.
Adoption	Rational and political negotiations ensue to get organizational backing for implementation of IT applications.
Adaptation	The IT application is developed, installed, and maintained. Organizational procedures are revised and developed. Organizational members are trained both in the new procedures and in the IT application.
Acceptance	Organizational members are induced to commit to IT application usage.
Routinization	Usage of the IT application is encouraged as a normal activity.
Infusion	Increased organizational effectiveness is obtained by using the IT application in a more comprehensive and integrated manner to support higher level aspects of organizational work.

FIGURE 1

COOPERATIVE CHIN IMPLEMENTATION MODEL



evolves from either organizational need (pull) technological innovation (push) or both" (Cooper and Zmud, 1990, p. 124). In the adoption stage, they describe the processes of "rational and political" negotiations, and in subsequent stages, they suggest that "technology" impacts the system implementation. Following this, three factor classes are defined: *push/pull factors*, *behavioral factors*, and *shared systems topologies*. Initially, at least, we contend that these factors can play a role at any stage of the implementation process. That is, these sets of factors continue to be important as organizations are pressured to change, examine opportunities for IOS solutions, obtain organizational backing, develop the IOS applications, and continue to engage in cooperative IOS arrangements.

Push or pull factors are contextual elements that can impact and influence an organization's willingness to participate in IOS initiatives. These factors can foster or inhibit change during the initial stages of the implementation process. Among the factors in this class identified in the literature are perceived competitive advantage,⁸ competition,^{4,8,9} government actions and policies,^{10,11} and perceived economic benefits.¹²

Among the push/pull factors, we expected both the *economic dimensions* and *government policies* to have a positive impact on the implementation effort. Health care organizations are currently being pressed toward greater cooperation by government decisions, policies, and practices (e.g., Medicare, Medicaid, Joint Commission of Hospital Accreditation, prospective

payment system). Furthermore, the need to reduce cost while maintaining or increasing quality is a key objective of numerous managed care models.^{8,13-15} Competition among institutions was expected to play a minor role, given the rise of community models of health care delivery,^{16,17} as health care players learn to cooperate and collaborate¹³ in an effort to overcome the limitations associated with previously noted economic dimensions.

Behavioral factors relate to attributes and actions of key system stakeholders. These include customer support (in this study, the customer is defined as the patient); end-user support,¹¹ organizational autonomy and control,¹² and physician, application vendor, and top management support.^{7,8,11} In the case of CHINs, application vendor support is vital for organizations to gain access to the needed products.¹⁸ Another critical behavioral factor is the political dynamics of the implementation process, which often impacts system endorsement and resource commitment.^{19,20}

Of the behavioral factors, *quality of CHIN management, vendor support, patient support, physician support, and end-user support* are all expected to have positive impacts on implementation progress. Each of these factors has been shown to foster change in various intra- and interorganizational domains,^{3,7,8,11,21} and the same result should be obtained in the CHIN context. Strong *autonomy and control* of member organizations, however, will tend to inhibit successful CHIN implementation, as organizations struggle with the tradeoffs of losing some autonomy to the benefits of shared information.²² *Political factors*, arising from conflicting personal and organizational objectives among stakeholders, will tend to impede implementation progress.^{10,23}

Shared or integrated systems topologies represent certain aspects of the infrastructure needed for a CHIN. These factors include arrangements for cooperation and information sharing as well as for assuring information quality.^{3,18} These cooperative arrangements for CHINs may include physicians, hospitals, third party payers, laboratories, and pharmacies and will require an increased degree of electronic information sharing with anticipated improved information quality.^{1,14}

Both elements of shared system topologies, *information sharing* and *information quality*, were predicted to have favorable impacts on implementation progress. The prior existence of shared systems would provide foundations for building more efficient and effective mechanisms for interorganizational, community-based health care delivery. As the degree of informa-

tion sharing among interorganizational participants increased, the quality of information available was also expected to increase, thereby fostering successful implementation.³

Our next purpose is to examine this model, derived from a single organization implementation context, and determine how well it holds in an interorganizational context. In our exploratory effort, the dependent variable in this model is *success of the implementation effort*.

RESEARCH METHODOLOGY

The proposed implementation model (Figure 1) is derived from the results of research that focused on systems internal to single organizations. Our interest is to see if these results can be extended to interorganizational systems, and to CHINs in particular.

While there is substantial variety among CHINs,¹⁷ we have focused on a single type of CHIN, the large-scale, voluntary network model. CHINs of this type are the most complex, involving the largest number and variety of organizational participants, and thus provide the most interesting test for our implementation model. In-depth case data were collected from three voluntary CHIN implementations: the Wisconsin Health Information Network (WHIN), Regional Health Information Network of Northeast Ohio (RHINNO), and Northeast Ohio Health Network (NEOHN). The parallels among these CHINs make them appropriate for our study. Each CHIN is located in the Midwest; they cover the range from big city to rural areas, and they share common initial objectives—that is say, sharing services among multiple health care players with the potential to increase profits. In addition, each of these CHINs is thought to have technology similarities with regard to data repositories, dedicated telecommunications media to enable interorganizational information sharing, and the IS expertise of a single vendor for technical, sales, and marketing support. Thus, this sample of three CHINs is a starting point to uncover patterns in the CHIN/IOS implementation process that can later be studied in a broader sample.

Thirty interviews were conducted with key participants in these three CHINs, including top management of hospitals (chief information, chief executive, and chief financial officers) and vendor representatives. Typically, CIOs or an internal hospital contact identified these representatives. Patient representatives/advocates, end users, and physicians involved in

the implementation process were also sought. In the cases studied, access to patients was not provided, and patient advocates were not identified for this research.

Each interview lasted from 60 to 90 minutes, and a standard interview guide was used to structure the interviews (see Appendix). About half of the participants received the questionnaire prior to the actual face-to-face interview. Only one participant asked not to be recorded; thus, 29 of the 30 interviews were tape-recorded. All taped sessions were transcribed and summarized within 24 hours. Each interviewee was shown his/her summary for accuracy and any additional clarification. Other data sources included written, statewide CHIN overviews, organizational meeting notes from vendor executives, technical literature, internal memoranda, and on-site systems demonstrations. A complete history of each CHIN can be found in Payton.²⁴

RESULTS

We compared the results of the three case studies to our *a priori* expectations. While all three cases are quite similar, and supportive of the *a priori* model for the behavioral factors, there is less similarity among the cases and less support for the model when we turn to the other factor areas. As indicated in Table 2, RHINNO and NEOHN are quite similar along several dimensions while both appear to differ from WHIN in the push/pull factors.

Of the three CHINs studied, only WHIN had reached the stage of significant systems use. RHINNO and NEOHN, as described in Payton,²⁴ seem to oscillate between the initiation and adoption stages of implementation. Furthermore, both RHINNO and NEOHN have continually confronted "environment/industry" scanning and negotiations—as the local mar-

TABLE 2

SUMMARY OF FINDINGS ACROSS CASES

	WHIN	RHINNO	NEOHN	Expected Impact
Push/Pull Factors				
Government	No impact	Negative impact	No impact	+
Competition	No impact	Negative impact	Negative impact	None
Economic factors	Positive & negative impacts	Negative impact	Negative impact	+
Behavioral Factors				
Top management Support	Positive impact	Positive impact	Positive impact	+
Vendor support	Positive impact	Positive impact	Positive impact	+
Patient support	No impact	No impact	No impact	+
Physician support	Positive impact	Positive impact	Positive impact	+
End user support	Positive impact	Positive impact	Positive impact	+
Organizational Autonomy & Control	No clear impact	Negative impact	Negative impact	-
Political issues	Negative impact	Negative impact	Negative impact	-
Shared system topologies				
Information sharing	Positive impact	No impact	Potentially positive impact	+
Information quality	No evidence	Uncertain impact	Potentially positive impact	+
IOS enablers				
Systems planning	No information—not assessed	Positive impact, if present	Positive impact, if present	Not in original model
Needs assessment				
Organizational Readiness				

kets and industry implement dynamic yet diverse electronic commerce models.

Moreover, each case varies substantially from the model's predictions with NEOHN and RHINNO showing the strongest parallels. The evidence for the shared system topologies is weaker than the behavioral and push/pull clusters, and provides only limited support for the original model. In addition to the three clusters of variables shown in the research model (Figure 1), another set of factors emerged as being critical to successful CHIN implementation. We call this cluster IOS Enablers, and it includes issues of *system planning, needs assessment, and organizational readiness*. While not posited in the original model, all of these factors have been noted in prior studies as critical to successful system implementation.^{18,23,25}

The results of these three CHIN case studies support the concept of dynamic phenomena depicted by a web of behavioral and push/pull factors similar to that shown in the original model. The data are supportive of the Cooper and Zmud⁶ implementation model for this interorganizational context. They suggest, however, that care must be taken in applying that model, as there are some key differences which arise in this context that were not present in the single organization context.

Push/Pull Factors

Our results suggest that there are significant differences distinguishing the WHIN case from the others. The differences are evident along the economic factors—as WHIN participants viewed both positive and negative impacts of these issues on the success of the implementation process. Regarding the *economic dimensions*, WHIN data suggest that this push/pull factor appeared to impact implementation progress, though the direction of that impact is ambiguous. The comments of one hospital CIO illustrate the consistent responses of the interviewees, and pointedly raises the question of how to measure the benefits of joining a voluntary CHIN group:

Efficiency savings have been experienced but these have not been quantified. Ownership dollars have been monitored but participation has not. It seems to be a long process, at least 5 to 7 years, before true returns can be quantified.

A representative of the WHIN vendor organization provides support for this position and suggests that quantitative measures are needed to justify the economics of CHIN implementations by stating: "It is dif-

ficult to quantify benefits though some are thought to be rather intuitive . . ."

RHINNO and NEOHN interviewees, however, believed strongly that both *competition* and *economic dimensions* had negative impacts on implementation progress. This is likely the result of capitated payments, transformation of local environmental forces, minimal Medicare reimbursement, new industry players, and diverse organizational views of electronic "transacting" (commerce) in the industry. Several hospital CIOs of potential participants explained both the impact and presence of *competition* as well as the role of *economic justification* for CHIN investments.

... In the economic environment of capitation, you will see more enterprise, not CHIN [community], systems. The average patient occupancy [in our region] is about 45 percent. With roughly 8,800 beds in Cleveland, only 1/2 or fewer than 1/3 are needed when you shift from fee for service to managed care and capitation. Now, there are three times more beds than are needed in Cleveland, and everyone is trying to increase their own market share.

The more tangible costs are those of vendors, like the telecommunications and large consulting organizations. They are champing at the bit because CHINs represent streams of revenue that they want control of it. But ... hospitals and to a small degree physicians (but I don't see them paying) are being asked to pay for CHINs.

As a mechanism to facilitate electronic commerce and suggested by the above comments by RHINNO and NEOHN managers, market forces that emerged as nonfactors in the WHIN case largely influence CHINs. According to one WHIN hospital CIO,

The rationale was to follow banking and airline models. Competition was not a major factor in the decision process to participate. We needed a community model to deliver care, but it is a challenge when competing models are increasingly on the rise.

RHINNO and NEOHN, however, illustrate that competition for electronic commerce health care infrastructures can be depicted by both regional and national events. Among these are managed care plans, physician groups and payment systems, which tend to drive health care organizations' information technology (IT) strategic direction, and to some degree, IT implementation success.

Shared System Topologies

As indicated in Table 2, there is a high degree of variance across all three cases regarding *information*

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sharing and information quality. In the case of WHIN, interviewees indicated that *information sharing* had a positive impact on implementation progress, while *information quality* had no apparent impact. The existing arrangements prior to WHIN (as a CHIN network) enabled some degree of information sharing. A number of respondents spoke of the importance of intraorganizational process reengineering, anticipating improved information sharing, but they questioned whether there would be any impact on information quality. A physician-user offered an explanation:

I can actually do without WHIN, but my decision making would be less efficient. WHIN simply expedites information sharing and decision making. It does not improve information quality. (Accessing the information is likely to change, but information quality will remain constant. Hospitals and others are hoping for improvements by implementing WHIN.)

RHINNO followed a pattern similar to WHIN though participants revealed that manual and some limited degree of electronic *information sharing*, even among competitive providers, has been in place for a number of years. It appears, although, that this information sharing had not reached the degree of electronic commerce as seen in existing financial and airlines industry models. To this degree, organizations closely guarded and monitored these activities to ensure that strategic data were not disclosed. Suggesting that full information sharing is not probable, prospective RHINNO and NEOHN members expressed concerns about the lack of industry standards, medical liability (particularly related to patient privacy, data mining, and confidentiality), and technology incompatibility among IOS participants.

As the Cleveland market settles down, this will be more plausible; but, sharing occurs as participants become more comfortable with each other. However, data sharing means liability sharing (Hospital CIO).

Sharing information with your competition is dangerous. The more information you share, the easier it is to lose your strategic advantage and/or niche. The more someone can glean from your information, the less distinct your services become (Hospital CIO).

Mixed findings were uncovered for *information quality*—as respondents determined that the RHINNO and NEOHN networks were too premature to predict its true impacts. While some felt that any enhancements in information quality would enable a successful implementation, others questioned whether these CHINs would affect information quality.

The more information and the more accurate the information, the better the quality . . . This involves solving more than the hardware problems. We must be able to compare apples to apples when sharing data and accessing (information quality), and this process is likely to evolve over years of effort.

Behavioral Factors

While diversity in outcomes has emerged from the push/pull and shared system topologies clusters, the *behavioral factors* varied less across all three cases, thus suggesting that these stand to significantly impact the early stages of the implementation process. A close examination of Table 2 denotes that the *only* difference is in *organizational autonomy and control* in the WHIN case. WHIN CIOs and CEOs, in particular, indicated that this issue was not of concern to their organizations since “participants decide what information to share and not to share.” Rather, stakeholders were simply looking for a mechanism to improve health delivery, quality of care, and electronic transacting of clinical information, in particular. This factor, notwithstanding, was significant for RHINNO and NEOHN. Several of the executives interviewed suggested a “warring” model had developed among potential organizations and spoke of increasing competition in the northeast Ohio health care market.

The only way that I would participate would be a read only basis. Is this participation? We don't plan to give away our autonomy or strategic advantage. Their definition of participation is financial payment (Payer CIO).

With no central repository, these issues are reduced or eliminated. WHIN is a central repository and we, at RHINNO, have a different objective. This came out of the initial CEO/CFO/CIO RHINNO meeting (Hospital CIO).

There is a need to maintain autonomy and control to increase market share at the separate organizations because

we all want greater market share in a shrinking environment (Hospital CIO).

Furthermore, and across all cases, *quality of CHIN management* was reduced to *top management support*—thereby eliminating *association support* from the model. All interviewees considered hospital top management as the champions needed to support CHIN technologies. As a member of the WHIN vendor team has observed,

They (hospital top management) have been the key to gaining WHIN support. One is a visionary (CEO); one signs the check (CFO), and one is responsible for delivery (CIO).

Moreover, local hospital associations were not considered significant players despite their current roles of pooling and representing competitive interests for a common objective. To this end, one CIO confirmed this:

... I am unsure how these outfits and other cooperative groups, including national groups, will survive. Their members compete against each other ... their existence is questionable in the future.

WHIN members, however, expected this to change, given the need to build critical mass and gain additional community endorsement of the network.

Overwhelmingly, *vendor support*, *physician support*, and *end-user support* were described as critical to each case's implementation effort. The degree of *vendor support* called into question WHIN's (the vendor) ability to deliver needed services to its customers (WHIN organizational members). Organizations expected CHIN vendors to understand not only the health care continuum but also how to manage and conduct electronic transactions along this progression.

Yet, Ameritech had concerns regarding the implementation effort. According to one Ameritech executive, and confirmed by organizational documentation, the dilemmas of the company are described below.

The problems are more with us not the customer. Ameritech is currently looking for resources to implement this network. We need project managers, and so forth, who will stay with the organization. One key resource left 1 week ago. The processes are not in place, here. [Our business units] need to talk to one another, and we simply are not communicating. Sprint can do this [implement and support CHINs] and I only expect problems to come soon. Everyone here is scared now that the contract has been signed. We stand to lose business, if we don't deliver.

This brings us to the issue of costs, and a number of potential NEOHN organizations expressed concern

about vendor pricing. This was especially so for smaller, community hospitals that tended to experience more financial difficulties. One hospital IS director expressed these anxieties following a vendor meeting.

The vendor is the expert. This is dangerous and like giving them a blank checkbook. We had a meeting with XXX and NEOHN members. The pricing for XXX services literally drove the room, particularly smaller hospitals, into silence.

Despite concerns about implementing these massive networks and unlike prior IOSSs (banking, financial, airlines), which tended to focus on consumer-to-business models of electronic commerce, CHINs were often described a means of supporting physicians in their efforts to deliver care. To this end, *patient support* was nonexistent due to a "lack of consumer understanding of the health care process." Furthermore, the focus of the RHINNO network was on physicians and their key role in the health care industry and their ability to impact electronic transacting. As one hospital manager stated: "Unfortunately, patients are seen as a byproduct. The real attention is being given to the docs."

Supporting this notion, an application vendor executive offered his view of the significant of the physician and the lack thereof regarding the patient:

There is no real patient involvement or support for CHINs. We got involved in this area only because the wife of a hospital CEO experienced redundant testing for breast cancer. (She) had to answer the same questions in five different hospital locations. But ... how many patients are wives of hospital CEOs. Hospital top management and physicians are what make CHIN implementations happen. Without them, it just does not happen. Hospitals must romance the physicians at no cost (avoid billing physicians for CHIN and other services) because they [physicians] bring patients to hospitals. For example, one surgeon is worth roughly \$500,000 per year to a hospital. When you multiply these numbers, this has a great impact.

Along with the politics of physician roles, personal and organizational *political issues* emerged as primary issues tending to impede the progress of CHIN implementations. Politics among application vendors and personality conflicts among CIOs and CEOs were often described as the biggest impediments to the implementation effort. Several hospital CIOs from each case offered:

CIO and CEOs' egos must be overcome. Some would like to have their own internal staffs to run infrastructures like WHIN. But ... these are infrastructures, and by the

way, CHINs are not typical IS projects. (Also), we must overcome vendor turf wars to help reduce some of the technological issues during CHIN implementations.

Frankly, NEOHN was distracted by GCHA and the Ameritech (RHINNO) venture . . . (and our progress was slowed).

GCHA is playing big brother and thinks because we are smaller, here in Akron, that we are going to jump on the RHINNO bandwagon. We are further along with NEOHN anyway.

IOS Enablers

Arising from the observations, we noticed that RHINNO and NEOHN interviewees spoke to the need for *a priori systems planning, needs assessment, and organizational readiness*. Therefore, Ameritech (the CHIN vendor), Ernst & Young (the CHIN consulting group), and GCHA (the local hospital association that managed the CHIN's governance) should have, as some stated, "done their homework" to determine the feasibility and justification of a CHIN. Several executives indicated that these factors must be in place *prior* to gaining consensus among potential IOS participants. To this extent, executives explained:

CHINs are solutions searching for problems. I know why I am doing my network—for strategic advantage and better control of care delivery. (Has a real need for the proposed CHIN been determined?) The proposed CHIN is premature. Are organizations ready for this technology (Payer CIO)?

In the last year, I have not heard a lot about (organizational) direction, and where NEHON stands is questionable . . . At first, people were throwing out solutions (CHINs) and now people are finding that the decision making is slow . . . A shared vision and strategic direction (planning) are fundamental to successful CHIN implementations (Hospital CEO).

ENVIRONMENTAL COMPETITIVE FORCES IMPACTING THE IMPLEMENTATION PROCESS

The above results demonstrate that WHIN, NEOHN, and RHINNO represent CHINs that have met different degrees of success. Both NEOHN and RHINNO have experienced cycles of interest, investment and development, but no sustained operation as CHINs. On the other hand, WHIN serves as both an application (CHIN) vendor and an IOS venture electronically supporting its multiple health care participants. What differentiates these situations, and what implications

can we draw from this for our model of IOS implementation?

Perhaps the biggest difference in the study results between WHIN on the one hand and RHINNO and NEOHN on the other, is the apparent impact of push/pull factors. While these factors showed little impact in the WHIN case, they had a largely negative impact for both RHINNO and NEOHN implementation. These factors are, no doubt, related to the environment. The nature of the market, geographical location, and infrastructure supporting CHIN implementation differentiates WHIN from the other two cases. The Wisconsin market is characterized by a fairly large group of relatively small, noncompeting health care providers. CHIN implementation in this environment is not a zero sum game. CHIN participants stand to lose little by engaging in cooperative information exchange processes. WHIN participants, unlike those in RHINNO and NEOHN, do not appear to endorse the idea that one organization's gain is another's loss. Furthermore, CHIN participation becomes particularly appealing as smaller organizations recognize their inability to fund such massive infrastructures on their own, and larger, free-standing hospitals and payers realize their limited ability to finance the expenditures associated with implementation. WHIN and its participants are located in a smaller urban environment (unlike CHIN initiatives in New York, Chicago, and Cleveland), where health care players tend to be geographically dispersed. This, in part, engenders the need to electronically share information and may explain the lack of concern for competitive forces in the WHIN case.

Figure 2 shows how the nature of the competitive environment might impact the desirability of shared IOS, including CHINs. In a large, urban market with many competing health care providers and/or payment plans, a highly competitive market develops (box 1 of Figure 2). Institutions within this market are generally technologically sophisticated and often have their own internal health care information systems and procedures in place to enable electronic data sharing. The nature of such markets could hinder CHIN implementations. Organizations in these competitive markets are likely to be unwilling to share information due to the perceived threat of competition. Consequently, there appears to be little justification for interorganizational cooperation or a voluntary CHIN in such markets. The Cleveland metropolitan market has these characteristics, and this may explain the failure of RHINNO to develop.

At the other extreme, small cities or rural areas with relatively few, geographically dispersed health care

FIGURE 2

MARKET/LOCATION MATRIX

		Number of Competing/Redundant Institutions	
		High	Low
Geographical Location	Large City, Urban	(1) Highly Competitive Medical Market Not favorable to CHIN Implementations	(2) Moderately Competitive Medical Market CHIN Implementations Depend on Other Conditions
	Smaller City, Rural	(3) Moderately Competitive Medical Market CHIN Implementations Depend on Other Conditions	(4) Noncompetitive Medical Market Favorable to CHIN Implementations

providers and payers present noncompetitive markets (box 4 of Figure 2). CHIN participation is most attractive in these cases, as organizations can engage in information sharing with little or no perceived threat of competition. The lack of service redundancy in the marketplace increases the likelihood that information sharing utilizing a shared infrastructure can add value. Markets in larger, less populous states are examples that fit this model. In such markets, push/pull factors like *competition* and *economics* identified in the proposed CHIN implementation model would likely favor implementation.

Boxes 2 and 3 represent moderately competitive markets, which can develop both in large and small metropolitan regions. These settings fall somewhere between the extremes of those markets characterized by box 1 or 4. They are likely to be smaller markets, or markets with less "density" of medical providers and payers. These are likely to be markets where the impact of competitive and economic factors on CHIN/IOS implementation is more difficult to predict. Markets like Milwaukee and Akron would seem to fall into this cat-

egory. In Milwaukee, the lower degree of competition allowed WHIN to proceed successfully. In Akron, on the other hand, NEOHN was less successful, perhaps due to the proximity (and overlapping) of Cleveland (and RHINNO), a large, competitive (box 1) market.

These different market situations suggest the need for alternative models, both for CHIN functioning and for CHIN implementation. Health care players in highly competitive environments may participate in IOS educational, general organizational information, and clinical services. Similar to trade associations, such health care cooperatives could pool resources to gain power through political lobbying, engage in knowledge transfer particularly in specialized domains, and seek purchase discounts for needed technologies and services. Widespread sharing of patient information, however, will not occur easily in such markets, as powerful players develop proprietary systems to serve their own needs and maximize their individual market shares. In less competitive markets, the true potential of CHIN functionality for sharing data among multiple providers is more likely to be realized.

Similar to trade associations, such health care cooperatives could pool resources to gain power through political lobbying, engage in knowledge transfer particularly in specialized domains, and seek purchase discounts for needed technologies and services.

As is evident from this study, the factors affecting CHIN implementation are likely to differ in these different market situations. While behavioral factors seemed to play similar roles in each case, push/pull factors and shared system topology (infrastructure) factors did not. The conditions for success depicted in the research model appear to be unattainable in certain environmental scenarios. This is particularly the case in environments characterized as a highly competitive. In these cases, the competitive forces, economic justification, political issues, and IOS enablers are most critical to determining implementation success—they emerged as the go/no-go factors in the research model. Thus, it appears that the market for cooperative CHINs may be limited.

SUMMARY AND LIMITATIONS

The proposed IOS implementation model derived from Cooper and Zmud's⁶ single organization model is able to capture the some aspects of CHIN implementation. The model, however, seems best suited to less competitive market situations where there is recognition that competition does not necessarily preclude interorganizational cooperation. Furthermore, our results suggest that competition is the overriding factor in the model, thereby implying that not all variables in the model are equally important. Health care organizations in some, more competitive markets have yet to rationalize the web of players (e.g., physicians and production workers, payers, providers, patients, government, and larger external environment) that stand to impact its (in)ability to form cooperative ventures. The case data indicate that large health care providers and payers in some markets are evolving toward less cooperative, more coercive IOS strategies. These organizations mandate IT direction, infrastructure support, and the degree to which competitors will

form cooperatives. This is evident in emerging health care organizations, such as Healtheon/WebMD and HealthMagic.

These results, while interesting, must be viewed as preliminary. This was an exploratory study and was limited to CHINs located in the Midwest. CHINs implemented in what the industry considers more advanced health care states, such as Oregon, Minnesota, and California, are characterized by a high degree of managed care and competition, and potentially can be impacted by a different set of conditions. Thus, another implementation model or subset of the current model may be more appropriate, and these results may not be applicable in more mature health care markets. Moreover, these early CHIN efforts speak to the challenges the industry faces as we enter the age of electronic commerce models, which stand to debunk archaic views of care delivery, patient as primary consumers, information privacy, and data management.

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APPENDIX

INTERVIEW GUIDE

Push/Pull Factors:

1. How do you anticipate (what has been your experience) government impacting the implementation of community health information networks?
2. What economic benefits is your organization anticipating (has experienced) as a result of participating in a cooperative CHIN effort?
3. Were there any costs to your organization as a result of participating in this effort? Do (have) the benefits outweigh costs? Explain.
4. How will (have) economic objectives be (been) monitored throughout the stages of the implementation process?
5. How has the competitive environment influenced your decision to participate in the CHIN? How (has) do you anticipate this to change throughout the implementation process?

Shared Topology:

6. What types of information will be shared (are shared) among CHIN participants? How have your information-sharing requirements changed throughout the implementation process?
7. How (has) will information sharing benefit your organization? What are some of the foreseeable limitations of information sharing among such diverse organizations?
8. Does the CHIN provide the precise (e.g., content), timely, current, relevant and accurate information you need? Does the CHIN provide quality information to facilitate your needs? If not, what is needed to improve information quality?
9. How has the CHIN impacted (expected to impact) the quality of the information that you receive (will receive) and use to facilitate decision-making?

Behavioral Facilitators:

10. What (has been) will be the role of the CHIN vendor(s)? When did (does) the vendor become critical to the implementation process? How has (does) this change throughout the process?
11. What types of services/expertise has/should the vendor provided?
12. How and when has/does your CHIN effort attempted to incorporate patient support and patient perspectives?
13. How and when has/does your CHIN effort attempted to incorporate physician support and perspectives? What was (is) the impetus for involving or excluding physicians in the implementation process?
14. How has (will) top management been involved in the CHIN implementation process? How has (will) the local hospital association been involved in the implementation process?
15. What end-users are (will be) involved in the CHIN implementation process? How was (will be) end-user support gained and assessed?
16. How has (will be) organizational control and autonomy been impacted during the implementation process?
17. Who (will be) are the key actors in the CHIN implementation effort? What (will be) are their roles, and how (will) did they conduct their respective roles? (Championship)

Other Issues:

18. What problems and/or difficulties has your organization experienced during the CHIN implementation process? Are there other critical factors to the implementation process that were not discussed? Given your current state in the implementation process, what predictions or expectations do you have concerning the other stages in the implementation process (e.g., acceptance, routinization, infusion)?
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