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Monica Garfield
Bentley College, mgarfield@bentley.edu

Arnold A. Kamis
Bentley College, akamis@bentley.edu

Cynthia M. Le Rouge
Saint Louis University, lerougec@slu.edu

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CHAMPION NETWORKS IN FEDERATED INTERORGANIZATIONAL SYSTEMS: CASE STUDIES IN TELEMEDICINE

Monica J. Garfield
Computer Information Systems Department
Bentley College
mgarfield@bentley.edu

Arnold A. Kamis
Computer Information Systems Department
Bentley College

Cynthia M. LeRouge
Department of Decision Sciences & MIS
Saint Louis University

ABSTRACT

Champions are critical to the success of an information system implementation. When implementing a large information system, research shows that success may require more than one type of champion. This study investigates the types of champions used in federated inter-organizational systems (FIOS) in a state telemedicine context. Case studies were conducted in Georgia, Pennsylvania, Ohio, and Wisconsin to identify the network of champions in state telemedicine systems. We found that FIOS that relied on a network of champions, including a sponsorship champion at the state level, as well as a technical champion and user champion at site locations, were more successful than those that lacked such a network. We suggest that our model of champions in FIOS applies not only to state telemedicine, but also to any large-scale system implementation spanning a federation of loosely coupled organizations.

Keywords: federated inter-organizational systems, champions, state telemedicine, innovation, implementation

"*The new idea either finds a champion or dies*." [Schon, 1963]

I. INTRODUCTION

Empirical research supports the idea that most successful technological innovations or projects are associated with at least one champion [Curley and Gremillion, 1983, Markham and Aiman-Smith, 2001]. Champions are "managers who actively and vigorously promote their personal

vision for using information technology … to ensure the innovation's success" [Beath, 1991]. Yet they often come from organizational leadership positions outside information system/technology departments. The champions are transformational leaders who are formally appointed or emerge informally. They need three sets of overlapping traits to be persuasive: personality, leadership, and experience [Howell and Higgins, 1990a, Howell and Higgins, 1990b]. In addition, studies indicate that champions are willing to take calculated risks [Howell and Higgins, 1990b, Markham and Aiman-Smith, 2001].

As information technologies mature and organizational boundaries become ambiguous, organizations engage in more federated inter-organizational systems (FIOS) for e-services. An FIOS is a highly interoperable IT system that spans and integrates a federation of systems, typically across different organizations, to work toward a common goal. Some of the earliest FIOS for e-services were in the airline industry, the automobile industry, hospital supply networks, and community health information networks [Payton and Ginzberg, 2001]. In these environments, the systems touch a large number of people who come from a range of organizations. In the case of an FIOS, the champion(s) for a system may play a variety of roles, including spanning horizontal and vertical boundaries, and navigating communication channels.

State telemedicine is the FIOS that provides a context for this study. State telemedicine is an e-service that spans organizational boundaries and a variety of stakeholders including state officials, hospital administrators, technologists, doctors, nurses, and patients who impact the system's adoption, diffusion, and use. These stakeholders collectively work towards the goal of improving or sustaining health using various forms of telecommunication technologies as part of the chain of medical care options to overcome the barriers of distance, cost, and scarcity of specialized medical expertise. Although they work together, the stakeholders in a state telemedicine FIOS are loosely coupled in executing their diverse individual responsibilities to deliver medical care.

This study poses two interrelated research questions:

- Which different types of champions can be found in a state telemedicine FIOS?
- Which network of champions is associated with greater success in an FIOS?

Few previous studies focused on the championship aspect of technology innovation. The role of champions in FIOS environments is particularly underrepresented. We use state telemedicine, an emerging e-service that aims to serve the public good and provide individual benefits, as a rich environment of study. Interviews with 31 potential champions in four different state telemedicine initiatives are used to gain insight into champion types in a state telemedicine FIOS.

We begin with a review of the FIOS and champion literature (Sections II and III) to provide the foundation for this study's perspective. We enrich this foundation with a description of state telemedicine (Section IV) and the potential role of champions in the state telemedicine context (Section V) . We then describe our study and results (Sections VI, VII, and VIII).

II. FEDERATED INTERORGANIZATIONAL SYSTEMS

The research on inter-organizational systems (IOS) may be divided into

- competitive or strategic IOS [Allen et al., 2000] and
- cooperative or collaborative IOS [Kumar and van Diesel, 1996, Volkoff and Chan, 1999].

An FIOS may include elements of both competitive and cooperative IOS, depending on the nature of the stakeholders involved [Kumar and van Diesel, 1996].

Both competitive and cooperative IOS are complex systems that may have substantial impacts on organizations, management, and users. Technical issues, organizational issues (e.g., change resistance) and inter-organizational issues may create barriers to the success of an IOS.

Furthermore, the nature and dynamics of these issues may change through the different stages of IOS implementation and diffusion. Success is far from assured [Allen et al., 2000].

In contrast to a competitive IOS, where the participating parties negotiate terms and write contracts, participants in a cooperative IOS report to the same federation-wide management, typically in a loosely-coupled manner [Beekun and Glick, 2001]. Since the coupling is loose, each participating organization enjoys significant autonomy from hierarchical control. Therefore, an FIOS is not an intra-organizational system. We conceptualize FIOS as a federation of systems spanning cooperating semi-autonomous organizations.

The FIOS scope may be narrow, similar to that of Electronic Data Interchange, or wide, similar to that of Supply Chain Management. Even at the narrow end of the spectrum, however, system adoption is not assured. While technical considerations are necessary, they are not sufficient conditions for adoption. Technological, organizational, and inter-organizational variables all impact the intention to adopt systems such as EDI [Chwelos et al., 2001]. Allen et al. [2000] also found social factors to be more important than technical factors for assuring involvement of, training for, and trust from users.

Cooperative IOS need corporate "statesmen" to anticipate and manage risks. Otherwise, successful interdependence can degenerate into conflict [Kumar and van Diesel, 1996]. In related work, Kumar and van Diesel maintain that an interactionist perspective, rather than a technical-economic or socio-political perspective, is the most appropriate for a cooperative IOS. The interaction perspective contends that trust, social capital, and collaborative relationships are the key factors for success in a cooperative IOS setting [Kumar et al., 1998].

Although IOS are becoming increasingly common in today's technologically inter-connected organizations (e.g., via Web Services), the role of champions in FIOS is not well understood. If FIOS continue to be a common approach to solving complex, multi-stakeholder problems spanning multiple organizational boundaries, the roles that champions play must be understood.

III. CHAMPIONS

While the success of a system may be attributed to a wide range of variables, studies repeatedly note that some individuals contribute much more to system success than others [Curley and Gremillion, 1983]. By promoting the project decisively and enthusiastically throughout the stages of adoption and diffusion, these individuals can strongly impact the ultimate success of an IT system [Howell and Higgins, 1990a, Howell and Higgins, 1990b]. The key individuals are identified in the innovation literature as sponsors, champions, change agents, product champions, and opinion leaders [Howell and Higgins, 1990b, Nadler, 1997, Rogers, 1995].

To provide the insight necessary to understand the phenomenon of champions within FIOS, we need to identify and differentiate the different types of champions who generate the adoption and facilitate the diffusion to other people touched by the FIOS. To define the scope of this study, we use a definition of champions from a review of the technology management championship literature by Markham and Aiman-Smith (2001): An IS champion is

"an individual who:

- Recognizes new technology … as having significant potential;
- Adopts the project as his or her own;
- Commits personally to the project;
- Generates support from other people in the organization [or federation]; and
- Advocates vigorously for the project."

We now distinguish specific champion roles within the FIOS context: sponsorship, technical, and user.

SPONSORSHIP CHAMPIONS

Sponsorship champions possess power and prestige in the organization, but also control sufficient funds and have the authority to facilitate adoption of a large- scale IT project [Beath, 1991, Bhattacherjee, 1998, Damsgaard and Scheepers, 2000, Schon, 1963]. A sponsorship champion is someone with the financial resources to make an IT system move forward. The sponsorship champion is typically not close enough to the end users to build the strong momentum that significantly increases the likelihood of system success. However, sponsorship champions often "mobilize capital and human resources for the project" [Bhattacherjee, 1998]. Sponsorship for a project in a large organization must span a set of high level managers [Jarvenpaa and Ives, 1991, Payton, 2000, Wixom and Watson, 2001]. Some studies suggest that top management sponsorship is the most important factor in IT system success [Somers and Nelson, 2004].

Jarvenpaa and Ives (1991) empirically demonstrated that executive sponsorship is crucial for setting the tone and the context for information systems success. However, their direct involvement should not be expected. The signaling of expectations and support for achieving them can be displayed by the sponsorship champion through many different mechanisms, such as announcements, bonus plans, and meetings. The CEO likely possesses neither the time nor the expertise to be directly involved, but he or she can have strong indirect influence [Jarvenpaa and Ives, 1991]. Our position agrees with that of Jarvenpaa and Ives.

Proposition 1: Sponsorship champions impact on system success positively, though their actions will be supportive rather than being directly involved.

TECHNICAL CHAMPIONS

Technical champions are the individuals who address the operational tasks of implementing, maintaining, and supporting the FIOS. They are responsible for deploying the system; correcting configurations; performing ongoing maintenance of underlying hardware, telecommunications, and operating systems; and the interoperation of applications. The new system may be foreign both to end users and to technical personnel. Both need to undergo some change and develop new competencies during the adoption and diffusion process.

Technological competence is an important prerequisite to supporting and using technological innovations effectively. One study showed that IT knowledge and experience were key indicators, explaining 34% of the variance in a business manager's intent to support IT innovation [Bassellier et al., 2003]. The importance of technological competence to the success of innovations is also supported by the management literature [Nam and Tatum, 1997]. The need for a technical champion to spearhead technological competence and IT support efforts clearly exists. The need increases as technological complexity, distribution channels, and the diversity of users increases. The technical champions can be informally self-appointed or formally authorized, but they must be technically competent to achieve system success.

Proposition 2: Technical champions impact system success positively through their actions related to the technical features of the FIOS.

USER CHAMPIONS

User champions serve two main functions. They need to shape user perceptions and attitudes, i.e., sell the system that management wants to implement. They also need to support and represent the end users, overtly and covertly, so that the end users know that their concerns are being taken seriously. Users tend to conform to management's expectations. Compliance will be stronger with a system which they believe upper management supports [Karahanna and Straub,

1999], e.g., through a formally appointed user champion. In addition, the user champion enables the users to feel that their compliance is voluntary rather than coerced. The user champion may need to work with the technical champion to ensure that systems function properly.

User champions need to build widespread user buy-in, that is, gain a critical mass of acceptance for the system. The user champions work closely with the system and the users, removing frictions and increasing usability. Acceptance is particularly important when the system is of strategic importance or is used by high-level decision makers in the company [Beath, 1991, Wixom and Watson, 2001]. User champions tend to play an active role in garnering support for a specific IT system, but they are not typically found among the IT staff. Rather, they are the informal "power users" or user champions formally appointed by management. The essential traits of a user champion include charisma, a transformational leadership style, enthusiasm, and the ability to market a project to others [Beath, 1991, Howell and Higgins, 1990b, Somers and Nelson, 2004, Wixom and Watson, 2001]. User champions possess the influence that enables them to overcome the resistance that may arise in response to a new system [Beath, 1991, Wixom and Watson, 2001].

The charisma of the user champions is important for persuading, inspiring, and encouraging the view that the new system should not merely be adopted but embraced. Furthermore, to support the users fully, a persuasive champion must be accountable, an active lightning rod for problems and opportunities, so that the users feel that someone represents them. Therefore, a good user champion simultaneously decreases the need and increases the ability of the users to be champions themselves. As with the technical champion, the user champion may be formal or informal, but the latter is less vulnerable to diminished motivational persuasiveness over time [Howell and Higgins, 1990a].

Proposition 3: User champions impact system success positively through their leadership for the users of the FIOS.

The technology adoption literature indicates that persons who are in contact with champions are more likely to adopt innovations [Rogers, 1995]. Yet the sponsorship, technical, and user champions are different from each other as well as different from a Chief Information Officer, technical innovator, or business innovator [Curley and Gremillion, 1983]. The decisive contribution of enthusiastic support and promotion distinguishes the champion. Most of the champion literature focuses on a single champion, even as systems expand in scope and impact. However, the FIOS's scope, technology complexity, and user domains of expertise make it difficult for one person to serve as all three champions.

For a system that is as expansive as an FIOS, a network of champions is necessary. The sponsorship champion (or perhaps champions) would need to orchestrate the network of user and technical champions. As the FIOS is deployed to different organizations, each organization should provide one technical and one user champion to the network. These champions not only support and promote the network within their respective organizations, but they must reach out to the champions in the other organizations that make up the FIOS. It is through champion-to-champion interaction that knowledge about the FIOS, past experiences, hidden barriers to FIOS success, and general tricks of the trade can best be passed on from site to site. Much of the experience from which the different champions learn is tacit. Hence a written document may not be the best medium to exchange experiences. We suggest that champions make personal connections with one another in order to facilitate the implementation and adoption of the FIOS across new nodes of the system as they come on board. Without such an interchange of ideas new sites may find that they unnecessarily experience some negative issues associated with the implementation or adoption of the system that could have been avoided, if their contacts with other sites on the FIOS were better.

In the case of some FIOS, coordinated action between sites is necessary for success of the system. When this is the case, the champions also need to coordinate with one another. As the

coordination efforts become more natural and interweaved with the way the various entities do business, the potential for FIOS success increases.

We argue that two individuals could fulfill the three champion roles, provided the sponsorship champion is separate from the technical/user champion, but that three individuals would be better. We also believe that, unless each organization in the network (excluding the initiating organization) includes both a technical champion and a user champion, the probability of success will diminish.

Proposition 4: A network of champions will impact system success positively.

Proposition 5: When a network of champions includes both a technical and a user champion at each organization, the FIOS will be more successful than an FIOS that does not have such a network of champions.

IV. STATE TELEMEDICINE

State telemedicine systems are FIOS systems that connect multiple types of healthcare facilities (e.g., hospitals, long-term health care centers, correctional facilities, clinics) and share a variety of information. Our definition of telemedicine is: an FIOS that

> *"involves the use of modern information technology, especially two-way interactive audio/video communications, computers, and telemetry, to deliver health services to remote patients and to facilitate information exchange between primary care physicians and specialists at some distance from each other"* [Darkins and Carey, 2000, p.2].

This study limits the scope of telemedicine it considers to those state telemedicine systems that use high-bandwidth medical video conferencing for the delivery of medical care.

Medical video conferencing experienced rapid growth since the early 1990s, primarily owing to advances in technology (e.g., increased bandwidth, new cameras and monitors, new coder/decoders (CODECs), and changes in the medical care environment (e.g., increased outpatient care, remote surgeries) [Crump et al., 1998]. In the U.S., the need for state telemedicine grew, due to the growing numbers of aging baby boomers, the increased need for improved medical access in rural areas, and the costs/risks associated with providing medical care to incarcerated individuals. This growth led to greater interest by governments in supporting and stimulating state telemedicine initiatives. Because of licensure issues associated with medical professionals, much of the government involvement in telemedicine is at the state level.

V. CHAMPIONS IN STATE TELEMEDICINE FIOS

In a state-wide telemedicine FIOS, Linderoth [2002] recommends a network of champions to play important roles. The champions are key individuals involved in FIOS implementation, the users of the FIOS, and the individuals who can be a large influence on the FIOS adoption and use. They come from among the state telemedicine staff, the physicians, and the nurses who will use the system, as well as from among the hospital administration and state politicians who work at the organizational level to coordinate the state telemedicine system [Garfield and Watson, 2003, Howell and Higgins, 1990b, Linderoth, 2002].

Physicians may be the most important users of state telemedicine [Hu et al., 2002, Payton, 2000]. Senior physicians (e.g., attending physicians) can be ideal user champions, whether for motivating users or for voicing general system usability concerns. Although attending physicians possess more influence than resident physicians, they tend to be less attuned to current technological innovations than resident physicians and nurses. Given the full range of state telemedicine system users, this study explores the types of champions who are necessary and helpful for successful FIOS implementation.

The governing agency appears to be the most likely entity to spawn a sponsorship champion. These agents may be a task force on state telemedicine that is spearheading the state-level state telemedicine projects or an appointed coordinating agent from the healthcare industry. In either case, this group creates the direction, sets the policies for network growth, and obtains the capital necessary for FIOS analysis, design, development, and implementation.

Previous work shows a need for a number of champions (sponsorship, technical, and user champions) in the adoption and implementation of large IS systems [Maidique, 1980, Somers and Nelson, 2004]. In the context of state telemedicine systems, special issues affect the user champion. In the state telemedicine context, the users – patients, clinicians, nurse practitioners, and physicians – garner their own levels of influence within the organization. The champion with a higher level of influence should impact system use more. Thus, a physician would be the most likely user champion. Furthermore, in state telemedicine FIOS, a number of locations are connected to the network and a sponsoring body oversees the operation of the network. Based on our review of the relevant literature, we formulated the model of champions needed for state telemedicine FIOS (Figure 1).

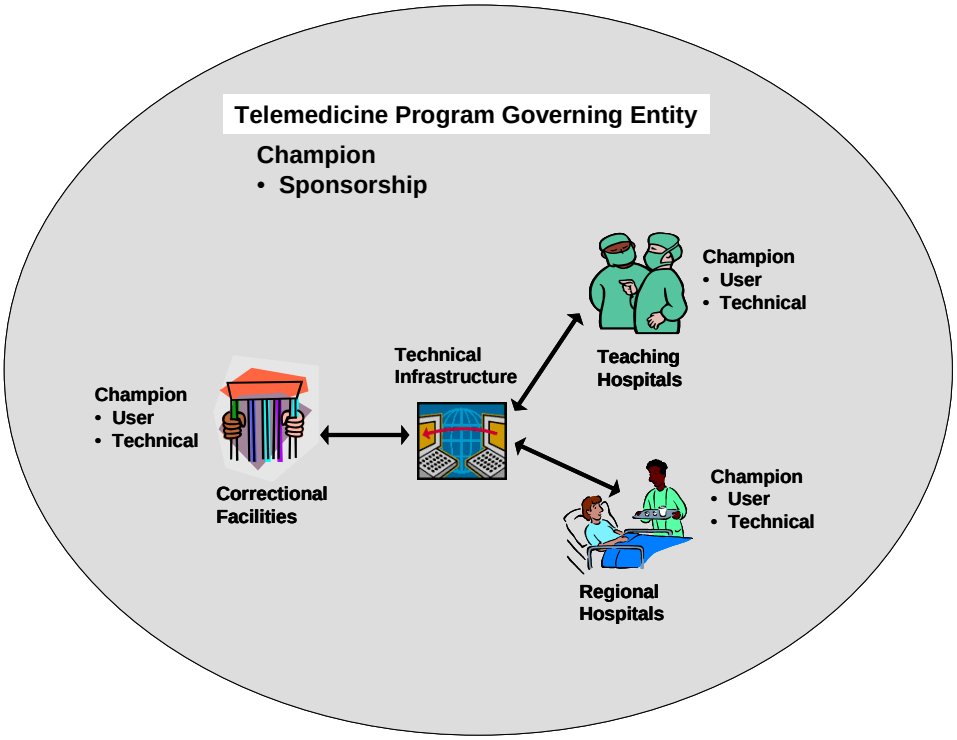

Figure 1: Model for State Telemedicine FIOS

At each site or node within the state telemedicine system, we believe that both a user and a technical champion are necessary. The user champion and technical champion can be two different individuals or two different roles played by a single individual. The governing entity (which may or may not be a node in the network) would need to establish a strong sponsorship champion for the system to flourish.

VI. RESEARCH METHODS

This research examines state telemedicine interactive video conferencing systems that are used by a range of for-profit and not-for-profit health organizations. To obtain in-depth knowledge of the state telemedicine environment in various U.S. states, the research methodology selected was the exploratory qualitative case method [Benbasat et al., 1987, Eisenhardt, 1989, Miles and Huberman., 1994, Yin, 1994]. To investigate the use of champions in the state telemedicine environment in the state, both secondary data and interview data were collected from four states: Georgia, Pennsylvania, Ohio and Wisconsin.

SITE SELECTION

Preliminary data were collected on all 50 state telemedicine policies since 1984 in order to identify the various state-run state telemedicine projects. A broad literature search (including the Institute for Scientific Information Citation Database, Medline, National Library of Medicine, and searches for active web sites in this field) for information about state telemedicine programs was conducted. Thinktanks (e.g., Benton Foundation, Hezel Associates), legislative groups (e.g. Western Governors Association, National Conference of State Legislatures) and non-profit state telemedicine groups (e.g., State Telemedicine Research Center, Association of State Telemedicine Service Providers) that were knowledgeable about the activities of multiple states were also contacted. Through this process, state telemedicine programs were identified and a brief synopsis of each state's state telemedicine activities was compiled. Only states with an active state telemedicine project underway were included in the final selection of state sites. To limit the number of confounding variables, an effort was made to match the states included in this study based on basic demographic information (Table 1):

Table 1. Demographic Data

	Georgia	Wisconsin	Pennsylvania	Ohio
Population (1,000)	7,486	5,224	12,020	11,186
Rank in U.S.	10	18	5	7
% in Metro Areas	68	67.7	85	81
Rank in U.S.	27	30	11	18
Doctors/100,000	196	217	273	219
Rank in U.S.	32	25	7	19
Prisoners/10,000[1]	48	25.2	27	40
Rank in U.S.	10	39	34	19

DATA COLLECTION

For the four states selected, data were collected from both secondary sources and interviews.

Secondary Source Data

To gain a richer picture of the state telemedicine environment within the four states, additional literature reviews were conducted, including searches in the popular press (magazines and newspapers), medical journals, academic journals, and Web sites. Sources of secondary data consulted included state legislation, U.S. census data, minutes from state telemedicine task force meetings and internal evaluations of state-initiated state telemedicine systems. These documents provided the background necessary to develop an understanding of the state telemedicine

[1] Many state telemedicine programs initiate with a program aimed at providing medical care for inmates.

climate and activities within each state and the key participants in the various state telemedicine systems. These documents were also used to identify potential case interview subjects.[2]

Interview Data

Although the secondary data provided insight into the role of various champions in the four states, it was also important to speak with individuals who were active in state telemedicine-related issues in the state. We made a concerted effort to include at least one interview subject from each of the following broad categories of people in each state to align with the potential sources of champion representation:

- State telemedicine users;
- State telemedicine program and medical leaders;
- State officials.

This approach resulted in conducting 31 interviews that took 20 to 90 minutes each.

State Telemedicine Users. To understand how the various state telemedicine networks were used within a state and which issues might inhibit or facilitate state telemedicine, users of the technologies were interviewed. Since state telemedicine networks can be used for a wide range of activities, the groups of users differed from state to state. The users interviewed were primarily physicians, nurses, and program coordinators.

State Telemedicine Program and Medical Leaders. Those who were closest to the program's development and implementation could add additional insight into identifying the champions of the system and their impacts. This group appeared to possess both breadth and depth of state telemedicine knowledge and state telemedicine policy, as well as relationships with the key participants in the system.

State Officials. State officials were a critical group to interview for their roles in state telemedicine initiatives. They were able to shed additional light on each state's underlying philosophy towards state telemedicine, and to outline potential goals of their actions. These state officials were located in the state legislature, in various state departments (most frequently in the Department of Administrative Services, the Health Department or the Department of Corrections), or on a committee that focused on state telemedicine projects.

Interview Subject Identification Protocol

A list of potential interview subjects for each state was compiled through a variety of sources, including articles about the state's state telemedicine program, state telemedicine-related Web sites and, in three cases (Pennsylvania, Ohio and Wisconsin), by their inclusion in the minutes of state telemedicine task force meetings. A database of active state telemedicine projects in each state was also searched to ensure the inclusion of individuals associated with the various state telemedicine projects in each state.

The compiled list of interview subjects was narrowed based on the potential knowledge of each interview subject. The goal was to interview at least one person from each of the three broad categories stated above (state telemedicine users, state telemedicine program medical leaders, state officials), and to speak with individuals from a wide range of organizations.

[2] The Bibliography at the end of this paper provides a list of secondary source materials.

Interview Protocol

All interviews were conducted by phone, except for informal conversations at the Medical College of Georgia. All interviews except one were recorded. In one instance, the interview subject declined taping the interview; case notes were taken to capture the essence of the conversation.

Before conducting the phone interviews, a semi-structured script was written that posed some open-ended questions to elicit candid responses and shed light on the research question. Information extracted from secondary data sources was incorporated into all interviews. By exhibiting knowledge of state telemedicine activities occurring in the state early in the conversation, the interviewer was able to move from basic information about the programs to more insightful reflections to identify champions in those programs. During the interviews, the script was used only for guidance, which allowed differing perspectives and language to be incorporated into the interview. All interviews adopted an open, reflexive tone.

Data Analysis

A hermeneutic approach to data analysis was used. The first round of transcript review happened after all interviews from the first state (Georgia) were transcribed. A preliminary coding schema was then developed. This schema went through four iterations, until it appeared to encompass the important issues covered in the first set of interviews. After an initial reading of the interviews from the second state (Pennsylvania), it became apparent that portions of the original coding schema needed to be clarified. Some categories were removed and new categories were included. This coding schema was then used for the Pennsylvania data.

For the third state (Ohio), the coding schema was slightly altered to consolidate some categories and to record additional contextual information. Then the transcripts were coded. At this point, the two original states (Pennsylvania and Georgia) were re-coded using the new coding schema. Finally, the transcripts of the fourth state (Wisconsin) were coded using the current coding schema.[3].

The data analysis efforts were primarily focused on information directly embedded in interviews, using secondary documents to give contextual understanding of the environment. A brief, fact-based case write-up on each state was used to ensure an adequate understanding of each state's environment. To increase the reliability of these write-ups, a subject from each state was given a copy of the case write-up and asked to verify its accuracy.

Overview tables for each interview and each state were also created. These tables summarized each of the subject's comments. After a summary table was made for each subject in a given state, an additional table was created to summarize information for the state as a whole.

VII. RESULTS

ILLUSTRATIONS OF FIOS CHAMPIONSHIP

In this section, we illustrate our model of FIOS championship with data from the four states.

Wisconsin. Wisconsin's state-run telemedicine initiative consisted of a task force, the University of Wisconsin (UW), and correctional facilities (Table 3). Wisconsin did not designate a sponsorship champion. A few legislators were interested in the legal aspects of state telemedicine (licensure, reimbursement, privacy, security, etc.), but that was the extent of their interest. The FIOS was attempted bottom-up, from the disparate networks upward, with the hope that a sponsorship champion would emerge. The University of Wisconsin (UW) had a champion

[3] NUD*IST, a software package by Q.S.R., was used to code data at the text unit level of sentences.

who appeared to have state telemedicine as a minor part of her job. A UW physician also championed the system, but was losing confidence in it as it continued to face numerous technical problems.

> *"The core group of users was lost when they tried to upgrade the network and ran into technical issues including hardware, software, training, and installations problems". (Program Manager, Wisconsin).*

From the correctional side of the network,

> *"We can't find anybody in the Department of Corrections who will take any responsibility or take on this project". (State Telemedicine User, Wisconsin)*

Although the Department of Corrections did appoint someone in charge of the state telemedicine efforts, he had little time to devote to the project. Wisconsin's Department of Corrections was hoping to address this issue by hiring an additional person to manage the program on a one-year contract. This individual would come from outside the group and work primarily on the technical aspects of the system. At the time of the interview, it was unclear whether this type of champion would be effective.

Ohio. Ohio's state telemedicine initiative consisted of the Ohio Department of Rehabilitation and Corrections, The Ohio State University (OSU), and the State of Ohio Telemedicine Task Force.

Although the system originally was not adequately supported at OSU, after eight months a full-time site coordinator was hired. The coordinator served as both the technical champion and the project administrator.

> *"The Department of Corrections and Rehabilitation paid for two and three quarter support people at the university [OSU], plus a full-time technical person and a project manager for the expansion phase. We had to hire two full-time people…on the state side to support the state telemedicine system, and we had to add incremental staffing as the program grew. With all these people, the state telemedicine program grew significantly". (State Official, Ohio)*

Although user champions were few in number on the Department of Corrections and Rehabilitation side, the presence of the support staff facilitated the use of the system by encouraging user buy-in. Even without strong involvement by physicians at the correctional facilities, according to a state official, the system flourished. However, on the Department of Corrections and Rehabilitation side of this system, the users felt that using the system was mandatory, not voluntary; the user champion had done an inadequate job persuading the users that using the system was in their own best interest.

Pennsylvania. Pennsylvania's state-run state telemedicine initiative consisted of PA HealthNet and the Department of Administrative Services (DOAS), a technical agency. Pennsylvania found that its system was being created and driven by DOAS with champions for only the technical aspects. Furthermore, there appeared to be no real champions at any of the rural sites. Lacking a champion at either the user level or the organizational level, PA HealthNet suffered:

> *"Although they (the state of Pensylvania) created PA HealthNet ... they really [didn't] pay a lot of attention to it in the beginning ... they needed to have greater involvement in the development in the whole program". (Program Manager, Pennsylvania)*

> *"Part of the problem is the fact that they fund the equipment side of it and don't fund anything on the program side ... It ends up without any program money, and it is just very, very hard to find somebody to champion it (PA HealthNet)". (Program Manager, Pennsylvania)*

Pennsylvania approached state telemedicine from a technical perspective. The system was given to selected medical facilities and these facilities received technical support but little additional program support.

> *"There was no one on the clinical side that asked for it. The state purchased equipment and supported the equipment from an administrative point of view, but nobody actually put together a program for its use". (Member, State Telemedicine Task Force, Pennsylvania)*

> *"The technology was an isolated effort, and there were no other kinds of organizational linkages". (Program Manager, Pennsylvania)*

Pennsylvania's network could not grow large enough to sustain itself. Although its 12 sites on the system were sufficient, the number of consultations was low, less than 50 in six months.

> *"They [the end users of the state telemedicine system] don't necessarily have a relationship with the people at those teaching hospitals … not people that they talk with or that they see, and there is not that feeling of comfort there". (State Official, Pennsylvania)*

Georgia. The Georgia state telemedicine system consisted of the Georgia State Telemedicine Program, the Medical College of Georgia State Telemedicine Center (MCGTC), and various telemedicine sites. For a site to become part of Georgia's state telemedicine system, it had to have a state telemedicine coordinator to oversee the telemedicine project. At first, Georgia recognized the demands the state telemedicine project placed on an institution and recognized the need for a technical coordinator at each site. Georgia found that user buy-in could be a problem when the site did not appoint a state telemedicine coordinator. Hence, Georgia selected coordinators with basic technical competence that also seemed to manifest champion potential. In seeking to fulfill this dual role, it was more important that the state telemedicine coordinators possess the ability to monitor technology stability and ease system access for users, rather than being well established in the organization or power users of the system.

The coordinator worked as the champion for the system on the technical side and helped promote understanding regarding how state telemedicine could benefit the medical facility. The formal appointment to the role of coordinator made the champion more visible and provided the overlapping power that encouraged institutional commitment to the use of the system. In addition, the formal role of coordinator created a situation in which enthusiasm and passion about a technology could overlap with self-interest in fulfilling one's formal role in the organization [Hu et al., 2002, Payton, 2000].

No specific user champion appeared; no single physician stepped forward to become the champion for this system. One possible barrier to the emergence of a physician champion was the inconvenience of the state telemedicine network:

> *"The physician does not have the equipment in the place where that physician practices. That means that the physician has to go to a different location. That means that it is not going to be parcel of your regular schedule ... you have to arrange the consultation with a consultant ... that has proven to be extremely difficult". (Physician, Georgia)*

The implications of this inconvenience seem to be related to two of Rogers' characteristics of innovation affecting rate of adoption: trialability and compatibility [Rogers, 1995]. Easy access and integration with current modes of operation are necessary to create the conditions necessary for trialability and compatibility to exist. Prior telemedicine adoption research indicates that physicians may become entrenched in a style or routine of practice; hence, the implementation context of new technologies should integrate with existing routines [Chau and Hu, 2002]. The need for integration and easy access appears to be needed for all users, including those who emerge as champions.

At some sites, the rooms were difficult to locate. Finding them would require a detour from the normal flow of medical practice. In one example, after speaking to several people at a healthcare facility, one person finally found the state telemedicine room. He made the following comment:

> *"[I finally] understood why they didn't know [where the state telemedicine room was] because they had found a little office in the back of something that you had to go up two separate elevators and down a couple of back corridors to get to the thing". (Medical Leader, Georgia)*

In Georgia, the champions for the statewide system were the staff at the State Telemedicine Center at the Medical College of Georgia (MCG)[4]. They accepted the primary responsibility, on behalf of the state, for creating a successful and growing system. Because one of the sites served as the champion for the entire FIOS, the FIOS was perceived by many as an MCG project rather than as a state project. On occasions, this impression caused some resentment towards MCG and the misconception that MCG was the owner of the Georgia State Telemedicine Program. Hence, it seems that the sponsorship champion should emerge from a federated structure that spans the component organizations. In Georgia, both the technical champion and the sponsorship champion provided operational guidance and created user buy-in through frequent communications with the various sites.

Analysis of FIOS champions

This section analyzes the four state telemedicine systems in light of the three types of champions, the network of champions present, and the location of the various champions in the network. Table 2 summarizes the types of champions found in each of the four states.

Table 2. Summary of Champion Types by State

	Wisconsin	**Ohio**	**Pennsylvania**	**Georgia**
Sponsorship Champion	No	Yes	No	Yes
Technical Champions	No	In Teaching Hospital and Correctional Facilities	No	In Teaching Hospital, Regional Hospital, and Correctional Facilities
User Champions	In Teaching Hospital	In Correctional Facilities	No	No

Table 3 summarizes the findings about the five propositions.

Table 3. Proposition Support

Proposition	**Support**
Proposition 1: Sponsorship champions have a positive impact on system success, though their actions will be supportive in nature rather than being directly involved.	Supported
Proposition 2: Technical champions have a positive impact on system success through their actions related to the technical features of the FIOS.	Partially supported
Proposition 3: User champions have a positive impact on system success through their leadership for the users of the FIOS.	Not supported
Proposition 4: A network of champions will have a positive impact on system success.	Supported

[4] The MCG staff did include physicians who used the state telemedicine system. However, no user surfaced as a user champion.

Proposition 5: When a FIOS has a network of champions that includes a technical and user champion at each organization, the FIOS will be more successful then an FIOS that does not have such a network of champions.	Not enough data

Sponsorship Champions[5]**.**

- Ohio's sponsorship champion appeared to help compensate for the lack of user champions at the various sites. Without a sponsorship champion, Ohio's telemedicine system would have found it more difficult to function.
- Wisconsin, without a sponsorship champion, encountered situations in which breakdowns in the system (i.e., when the network was upgraded) caused the momentum of the network to falter and support for the system to suffer. With a stronger sponsor orchestrating the network as a whole, we believe that incidents at specific sites on the network would not have impacted the Wisconsin system as negatively as they did.
- Although the state provided financial backing for the Pennsylvania's state telemedicine system, it failed to provide coordinated non-financial support for the network. As a result, the Pennsylvania Healthnet was inhibited.
- Georgia's sponsorship champion was the strongest. The Georgia statewide telemedicine program (GSTP) was funded by the state with money collected from a fine from a lawsuit against telecommunications companies. This lawsuit gave GSTP the financial backing required for a successful sponsorship champion., Georgia, however, went beyond providing financial support for the network. It created a task force that guided the project through administrative details and the planning of network-wide goals. This task force impacted system success positively.

We conclude that Proposition 1 is supported.

Proposition 1: Sponsorship champions impact on system success positively, though their actions will be supportive rather than being directly involved. - Supported

Technical Champions.

- Wisconsin failed to provide a technical champion, which resulted in technical failures that led to the loss of a core group of users. It is possible that, with a strong technical champion, the system would not have encountered such technical difficulties and thus may have been able to be more effective.
- Ohio's few technical champions kept the system running and enabled its use. Without these champions, the system would not have been able to work.
- Pennsylvania did provide basic technical assistance, but it came from the sponsorship level, not from the nodes of the telemedicine network. Although Pennsylvania provided some centralized technical support for the system, it did not create the site-side technical support necessary to make the system effective for the end users.
- Georgia's sponsorship champion recognized the need for a technical champion to be appointed at each site of the network. These champions were not only technically savvy but also considered issues related to the system users. As a result, the system was technically sound, which led to increased user buy-in.

[5] To make the discussions of the propositions easier to follow, the findings are presented as bullets for each state.

Given these findings, we believe thatproposition two is only partially supported. Pennsylvania did have one technical champion. It appears, however, that a network of technical champions may be needed at each site for the technical aspects of the system to be more effective.

Proposition 2: Technical champions impact system success positively through their actions related to the technical features of the FIOS. – Partially supported

User Champion.

- A user champion emerged in Wisconsin from its teaching hospital (University of Wisconsin). However, this champion began to lose interest as technical problems arose. In the case of Wisconsin, the user champion was most effective once the technical champion was in place and provided system stability to encourage use.

- A user champion did not appear at any of Ohio's sites. The technical and sponsorship champions appeared to assume the user champion role. Although the user champion role was not adequately executed and user interest was low, the system still flourished.

- In Pennsylvania, a strong user champion was not found at any site. Because of the few consultations that took place over PA Healthnet, the use of the system suffered.

- Georgia did not seem to have a strong user champion at any of its sites. This lack did not impact negatively the effectiveness of the system.

We found it surprising that few user champions emerged from any of the systems at any of the sites. Perhaps this phenomenon was caused by the immaturity of the technology and that more technology champions will emerge in the future. Therefore, we did not find support for proposition 3.

Proposition 3: User champions impact system success positively through their leadership for the users of the FIOS. – Not supported

The two statewide telemedicine systems that were the most successful (Georgia and Ohio) also had the most champions in place. Pennsylvania, with virtually no champions, and Wisconsin, with a user champion at one site, were the least effective systems. Therefore, we believe that a network of champions does impact system success positively and that proposition 4 is supported.

Proposition 4: A network of champions will impact system success positively. – Supported

Although our data lead us to believe that a user and technical champion at each location would make a system more successful, in none of the systems we studied was such a champion network in place. We believe that this result may be due to the immaturity of the technology, and that, over time, a full network of champions will emerge. Therefore, we are unable to assess proposition 5 with the data available to us.

Proposition 5: When a network of champions includes both a technical and user champion at each organization, the FIOS will be more successful than an FIOS that does not have such a network of champions. – insufficient data.

VIII. DISCUSSION

A complete network of the recommended champions was not found in any of the states. The number of champions was greater in Ohio and Georgia than in Wisconsin or Pennsylvania. As Wisconsin and Pennsylvania showed, any site that lacked both a technical and a user champion enjoyed far less success. Table 3 in Section VII summarizes champions by state.

Our study of state telemedicine FIOS is consistent with the existing literature on champions in state telemedicine initiatives. Champions can counter organizational inertia and resistance to

technology [Schon, 1963]. Large information systems, particularly those that impact the current behavior of the actors in an organization, benefit from the presence of a champion [Beath, 1991]. Technological, organizational, and inter-organizational factors are important [Chwelos et al., 2001].

This study's main contribution is that not only is a federation-wide sponsorship champion important, but so is a network of champions across the system. In essence, the sponsorship champion operates at a strategic organizational and inter-organizational level, whereas the technical and user champions operate at tactical and operational levels, respectively. This study explicates these specific champion roles for consideration in the FIOS context as defined for state telemedicine.

SPONSORSHIP CHAMPION

Early in the program, an FIOS sponsorship champion is essential in generating interest in the program and in coordinating its deployment. A sponsorship champion who represents the FIOS state telemedicine network is important, but if that person is too close to one site in the FIOS network, a differential relationship among the sites can be created, which may inhibit the project. Our findings are consistent with Jarvenpaa and Ives (1991), in that the FIOS-wide person should be a sponsorship champion, not a technical or user champion for one of the sites.

The sponsorship champion must be identified at the federation project level. The impact of a sponsorship champion is directly related to how the system is implemented, what is expected of the sites, and how the system is used. These factors are largely ones that affect the implementation of any large information system that impacts multiple organizations and changes the behavioral patterns of the user. To gain buy-in from the local user champions, who will, in turn, invest their expertise to enhance the technology and build wider user acceptance, the sponsorship champion needs to signal that the FIOS is a long-term commitment.

User Champions

The types of users vary by the type of site. The remote or referring sites may find that their user groups consist primarily of lower level medical staff (e.g., a registered nurse, physician assistant, or a resident physician) who are not sufficiently influential to promote system adoption. Typically, the user champions who can make a significant difference in the use and acceptance of the state telemedicine system are the consulting specialists. These users possess the scarce expertise which others in the FIOS need to access, and the users' social influence is necessary for them to be user champions

During many real-time state telemedicine video consultations, the referring physician does not need to be present, and a less expensive associate can present the case. However, the specialist must always be present. Therefore, the specialist needs to participate in a high volume of cases to make the system economically viable. By increasing the specialist's use of the system, he or she is in a better position to become comfortable with using the system. In our study, persistent user champions did not emerge at any site. We still believe that, in the long-term, systems need such champions to emerge, but this finding highlights a possible shortcoming of the telemedicine user environment. In particular, it may be inherently difficult to encourage system adoption from specialist physicians in a telemedicine environment.

TECHNICAL CHAMPIONS

Although the user champion can play a significant role in guiding the use of the system, in engaging system interest, and in gaining organization-wide acceptance of the system, he or she is not as important as the technical champion in the early stages of system deployment. The technical champions ensure the system runs smoothly and effectively, an outcome that is needed to gain user buy-in to the system. Regardless of the quality of the end-user champion, if the technical aspect of the system fails, the system will fail.

DYNAMICS

While implementing an FIOS, the need for champions should be addressed at the appropriate stages in the system's development. We found a temporal dynamic to hold true: the technical champion was more important at the beginning of the FIOS. As the fundamental technical problems were solved, the foundation was laid for user problems to surface – and be solved – by the user champion. The user champion was integral to the development of critical mass adoption. All inter-organizational dynamics had to be watched closely by the FIOS sponsorship champion, from project inception to implementation.

The weak node in the champion network for state telemedicine systems was typically a correctional facility. The correctional facilities often lacked both a technical champion and a user champion. That pattern may be due to lack of funding in these facilities and/or that the primary business objectives for these nodes did not include the need for state telemedicine treatment of their patients, e.g., prisoners. Due to state telemedicine being perceived as a “win-win situation” in correctional facilities, it is also possible that the organizational structures and the ingrained culture within the correctional system were more resistant to change than the cultures of other nodes in the state telemedicine network. This finding suggests that an organization looking to adopt and implement an FIOS should pay special attention to nodes in which the culture is resistant to change. In these nodes, the champions will need to be cultivated and supported for the node to add value to the FIOS.

IX. SUMMARY

In summary, our most important finding is that FIOS success increases when there is a federation-wide champion in conjunction with a network of site champions. To accomplish this goal, we make two recommendations:

1. Establish a sponsorship champion for the overall federation;
2. Establish a technical and a user champion at each participating site.

The technical and user champions can be the same individual, but this arrangement may compromise one role in favor of the other. The number of champions correlates with the degree of success experienced in the four cases presented.

Understanding how a state can impact state telemedicine is a highly complex task. What works for one state may not work for another, and what works at one point in time for one state may not work at a different point in time. The findings of this study help identify the types of champions to consider when implementing a state telemedicine system.

We acknowledge that factors beyond a champion’s control impact the success of an FIOS’s adoption and diffusion. Champions are, however, a significant positive force for generating the energy required for technological adoption and diffusion. This study examined championship in a state telemedicine context. This work should be followed by studies that further specify detailed best practices of champions in state telemedicine and other contexts, and by further investigation into the impacts of champions on FIOS success. Additional research needs to be done to determine whether our recommendations hold true for other state FIOS outside telemedicine and FIOS initiatives in the private sector.

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ABOUT THE AUTHORS

Monica J. Garfield is Assistant Professor of Computer Information Systems at Bentley College. Her research focuses on the use of IT to enhance creativity, the impact of technology on group interactions, and knowledge creation. She also works on the socio-technical issues of telemedicine that impact the implementation of telemedicine networks. Her work appears in journals such as *Information System Research, MIS Quarterly, Communications of the ACM* and the *Journal of Management Information Systems.* She is the editor of the ISWorld Net's Data Base Course and a member of the Teradata University Network advisory board.

Arnold A. Kamis is Assistant Professor of information systems at Bentley College. His teaching and research interests are in electronic business, decision support technologies, and human-computer interaction. His publications appear in *Communications of the ACM, The Database for Advances in Information Systems* and in the proceedings of the *Hawaii International Conference on System Sciences, Americas Conference on Information Systems, Workshop on Information Technologies and Systems* and the *North American Case Research Association.* He serves as a chair for the HICSS Minitrack on Electronic Marketing and is Web Site Editor for the *Journal of Management Information Systems.*

Cynthia M. LeRouge is Assistant Professor of Information Systems at Saint Louis University. Her current research interests relate to healthcare information systems, information systems personnel, and technology-mediated learning. She previously worked in consulting, training, controller, and analyst roles in the software, healthcare, public accounting, and petrochemical industries. Her publications appear in the *International Journal of Human Computer Studies,* the *Journal of Informatics and Education Research,* the *Journal of Computer Information Systems,* and the *International Journal of Healthcare Technology and Management.* She is also the author of chapters in research-based books.

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