

2005

# Increasing Absorptive Capacity through Strategic Use of Network Organizations

Dirk S. Hovorka

*University of Colorado at Boulder, dirk.hovorka@colorado.edu*

Kai R. Larsen

*University of Colorado at Boulder, kai.larsen@colorado.edu*

Follow this and additional works at: <http://aisel.aisnet.org/amcis2005>

## Recommended Citation

Hovorka, Dirk S. and Larsen, Kai R., "Increasing Absorptive Capacity through Strategic Use of Network Organizations" (2005).  
*AMCIS 2005 Proceedings*. 270.

<http://aisel.aisnet.org/amcis2005/270>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2005 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# Increasing Absorptive Capacity through Strategic use of Network Organizations

**Dirk S. Hovorka**

University of Colorado

[Dirk.Hovorka@colorado.edu](mailto:Dirk.Hovorka@colorado.edu)

**Kai R. Larsen**

University of Colorado

[Kai.Larsen@colorado.edu](mailto:Kai.Larsen@colorado.edu)

## ABSTRACT

Distributed organizations face numerous difficulties during implementation of knowledge-intensive projects. These types of initiatives require that organizations have *absorptive capacity* or the ability to acquire, assimilate, transform and exploit new knowledge. This case study examines IS adoption strategy based upon the effect of organizational structure on the ability of the organization to implement an large scale information system. A specific type of network organization, called a consortium, was strategically selected to increase the flows of information as well as each organization's absorptive capacity. A critical component in increasing absorptive capacity was the strengthening of the social communication network through the use of formal meeting and the emergence of informal communication ties. In addition, the tendency for organizations to engage in direct contact with other organizations they view as similar (homophily) strengthened the network. The social communication network, in turn, supported the dynamic flow of absorptive capacity elements to support network members deficient in some capabilities. Implications for other knowledge intensive initiatives, such as IS implementations, are discussed.

**KEYWORDS :** Network organization, absorptive capacity, consortium, social networks, homophily

## THE CHALLENGE OF KNOWLEDGE-INTENSIVE INIATIIVES

Distributed organizations face numerous difficulties during knowledge-intensive initiatives such as adoption of large-scale information systems. Challenges include acquiring and distributing resources, lack of knowledge sharing, lack of standardization, geographical distances, incompatible data systems, and obtaining technical support. In some cases, previously hierarchical communication patterns or negative attitudes toward technology must also be overcome. Critical to success of knowledge-intensive initiatives is the organization's *absorptive capacity* (ACAP) or its ability to acquire, assimilate, transform and exploit new knowledge (Zahra and George, 2003; Cohen and Levinthal, 1990). The research question addressed in this case study is whether absorptive capacity can be increased. The purpose of the paper is to conduct theoretical development regarding the influence of social communication networks on ACAP, based on empirical evidence.

In 1996, the director of the New York State Probation Automation Project faced the challenges associated with the distribution and adoption of a large-scale information system. A consortium model of network organization was selected to enhance the ACAP of the fifty New York Probation departments and distribute information, social influence, and technical support critical for successful system adoption which. The examination of this initiative, with insights from the sixteen participating directors, demonstrates how organizational networks can be used effectively to increase the organization's absorptive capacity.

### The New York State Probation Automation Initiative

Probation departments are a part of the criminal justice system and provide an alternative to incarceration for criminals whose crimes or family situations justify community inclusion. In 1996, after years of budgetary and information technology neglect, probation departments in New York State were struggling with case management, collection of restitution, and the lack of computerized records. Traditionally, the funding for criminal justice activities has gone to the front-end of those activities: law enforcement, the prison system, and parole. Over the previous decade, the departments' funding had declined

as did the reimbursement rate to localities to provide basic probation services. Politicians desiring to be seen as “tough on crime” became less inclined to support higher risk community inclusion over traditional incarceration. This position was due in part to the Probation system’s inability to provide data to support its argument that Probation was both a more cost-effective and more successfully rehabilitative alternative to enormously expensive prison systems.

As a result of the shift in funding, the local departments gained a higher level of autonomy and independence that led them into technological backwater. A result of the low priority affixed to file management and other back-end activities is that probation departments historically have lacked the technology needed to improve the efficiency and effectiveness of their core operations. Recognizing this problem, the two state agencies responsible for probation in New York State (NYS) sought to correct the deficiencies in probation and undertook an automation survey of the 50 small-and mid-size local probation departments. The survey found that although some departments had begun to migrate to personal computer-based records, half of the departments still used paper forms. More important though, was the finding was that many probation departments were currently in the process of developing their own information systems. These efforts were disjointed and costly, both at the local and the state levels, especially since the state reimburses 28% of such expenditures. Without intervention, there would soon be as many as 50 kinds of probation information systems with an increased cost to both the State and the localities. The lack of standards would make inter-departmental and department-state electronic record sharing almost impossible.

In addition, 70% of the departments felt the system they were currently using met only some, few, or even none of their operational requirements. Based on this dissatisfaction, departments indicated that the development of a probation management information system was of high priority, and the state leadership decided to initiate a statewide probation information system project. The department hired an outside project director, who was experienced with most aspects of systems planning and development, as well as with probation services. With minimal staff support, he set out to create a project support team consisting of volunteers from local probation departments. With extensive local involvement, a request for proposals and an evaluation protocol were developed and a specific information system named PROBER was selected and customized. Because of financial and political reasons it was decided that local departments would need to pay a license fee for the system, and that adoption would be voluntary. NYS county probation departments are dispersed over a wide geographic area and serve diverse communities (urban, rural or a combination). In addition, the New York probation system depends on centralized State grants-in-aid, planning, and information collection, with direct probationer investigation and supervision provided by fifty-seven local county probation departments. Each county has a great deal of latitude in selecting Directors of Probation, organizational practices, and information system development. This required a novel approach to system planning, development and deployment.

### The Absorptive Capacity of Organizations

Absorptive capacity is a set of organizational abilities to manage and use new knowledge (Cohen and Levinthal, 1990) and has four distinct dimensions (Table 1): acquisition, assimilation, transformation, and exploitation (Zahra and George, 2003). ACAP relies on both external connections and internal social networks that link the dimensions within and between organizations, thus facilitating the distribution and exploitation of knowledge.

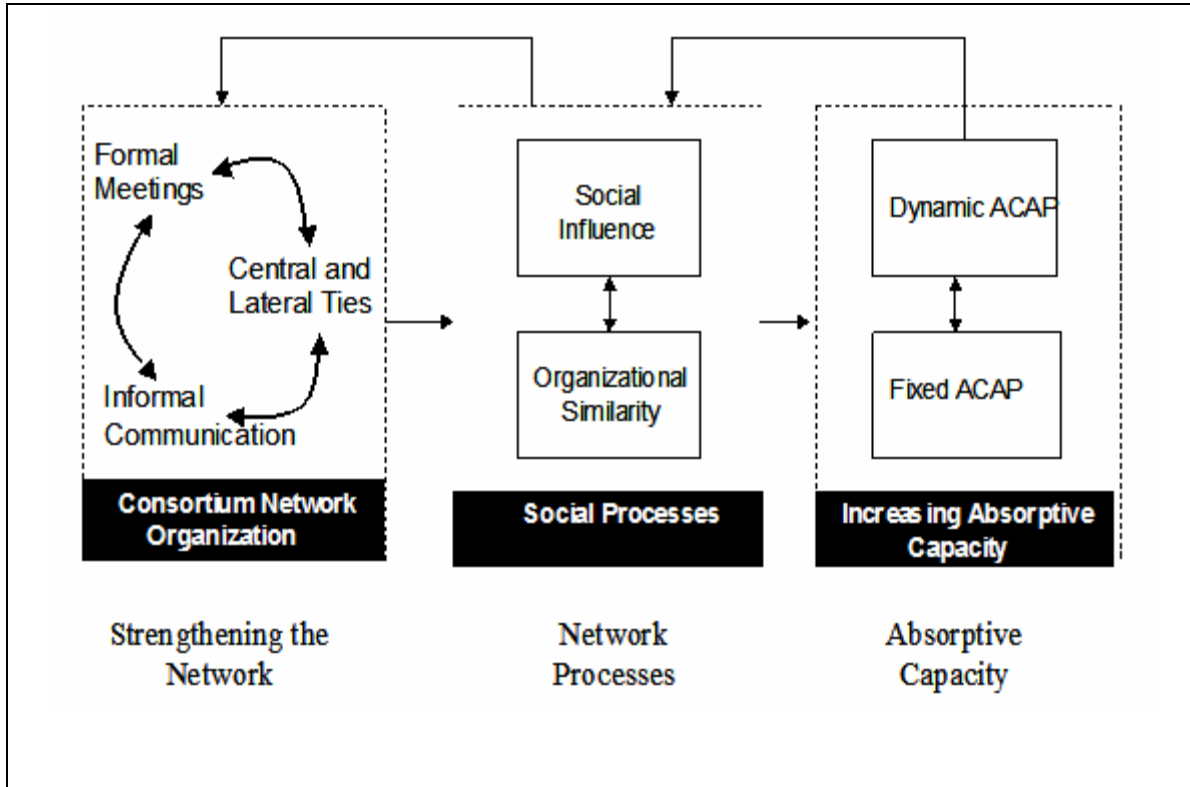
ACAP Dimension	Definition
Acquisition	Ability to recognize, value and obtain external knowledge.
Assimilation	Incorporation of external knowledge and combination with existing capabilities to increase internal knowledge.
Transformation	Ability to adapt and integrate new knowledge with current business practices.
Exploitation	Ability to utilize new knowledge for commercial purposes.

**Table 1. Components of Absorptive Capacity**

Prior work on organizational absorptive capacity has identified the porosity of firm boundaries and formal and informal network structures (Matusik and Heeley, Forthcoming - 2005) and previous experiences of individuals (Cohen and Levinthal, 1990; Taylor and Todd, 1995) as contributing aspects. The time and resources dedicated to acquiring and distributing information are also critical components in achieving increased ACAP.

**FROM ORGANIZATIONAL FORM TO ABSORPTIVE CAPACITY**

Three theoretical perspectives: strengthening the network, social and informational influence, and homophily to facilitate communication in the consortium and increase members’ ACAP. Figure 1 outlines the steps leading from the creation of a consortium-based network organization to increase the absorptive capacity of the member organizations for new knowledge and provides the roadmap for the discussion of the processes.



**Figure 1. Interactions in Consortia Network Organization**

The activities and interactions of the consortium were implemented (1) to increase knowledge acquisition and sharing related to the automation project, (2) to accelerate the distribution and installation of the system, and (3) to increase adoption. These knowledge flows and social communication network processes are highly intertwined and can reinforce the acquisition and assimilation of knowledge. Organizational network form, network processes of social and informational influence and homophily can all lead to increased absorptive capacity, and each of these steps are detailed below. The interactions and relationships in the communications networks can be clearly explained by comparing a successful and an unsuccessful consortium during the knowledge intensive adoption of an information system.

**ORGANIZATIONAL NETWORK FORM**

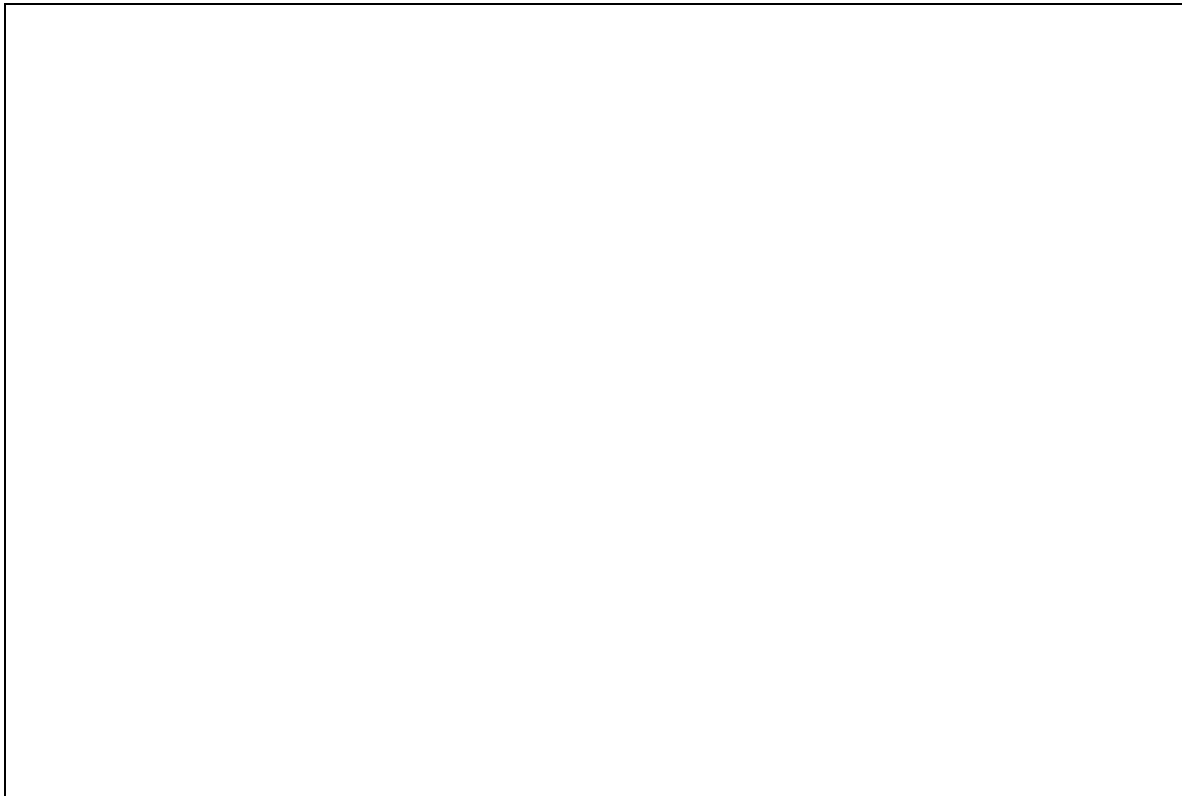
The project director decided to strategically create a network organization (Table 2) during the implementation process to increase the flow of information necessary to increase adoption of the system as well as to mitigate the complications due to departmental differences and the lack of trust in the state’s ability to deliver a functional information system.

- Characterized by flexibility, decentralized planning and control, and lateral ties with a high degree of integration of multiple types of socially important relations across formal boundaries. (Baker, 1992)
- Autonomous organizations that come together to reach goals that none of them can reach separately.

- Particularly suitable for circumstances in which there is a need for efficient, reliable information (Powell, 1987).
- The most useful information does not flow down the command chain, it is obtained from someone with whom one has had prior dealings and has found to be reliable.

**Table 2. Characteristics of the Consortium Network Organization**

In September of 1997, it was proposed that an organizational network based upon consortia (Figure 2) be used to implement the automation system in the probation departments in a phased manner, rather than sequentially. The 50 local probation departments were split into eight consortia (initially seven, followed by split of one consortium), each with a lead department responsible for being the first to implement the system and for facilitating cooperation between the counties in the consortium.



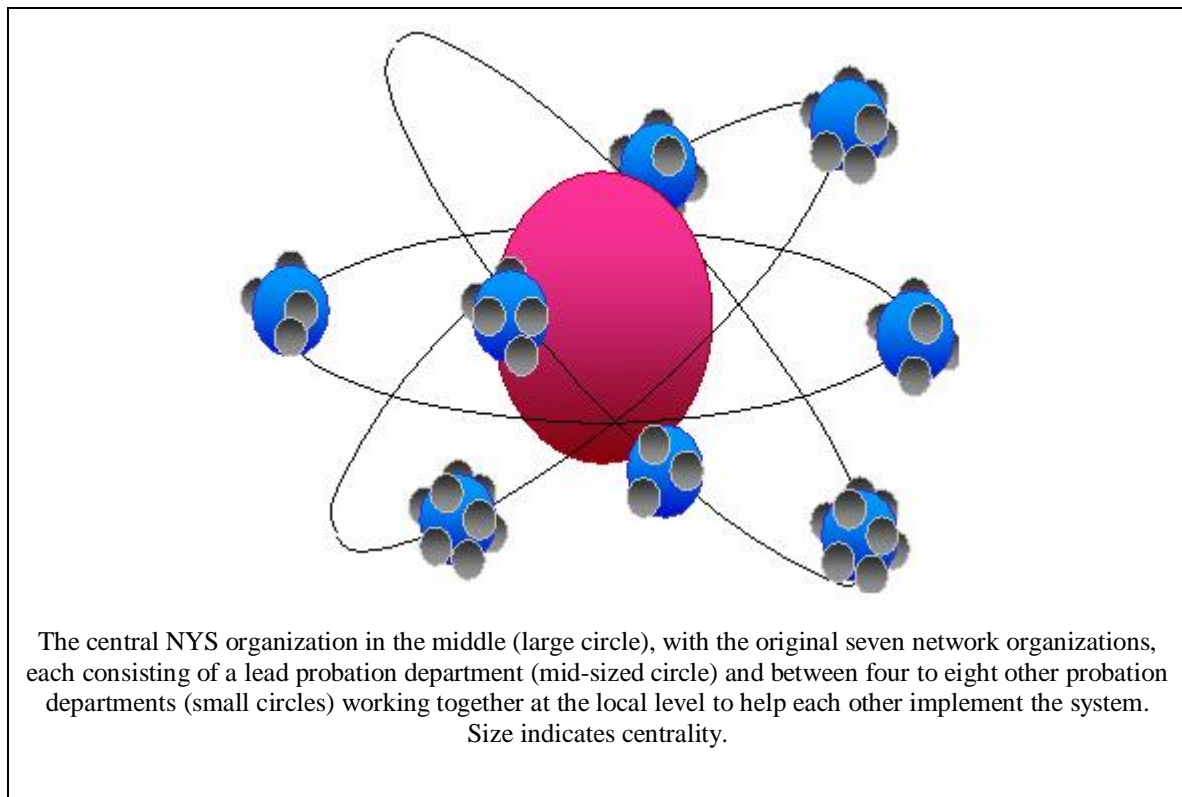


Figure 2. Consortia Model

The expectation was that such an arrangement would increase knowledge sharing related to the project between the counties in a consortium, accelerate the distribution and installation of the system, and increase the level of adoption. An independent research center stated that the Probation Automation Project reflected “the best thinking of scores of public managers about principles and practices for conducting state-local information systems projects in an environment of devolution and boundary-spanning policy and program initiatives” (Dawes et al., 1997 p 15).

The roll-out plan (Figure 3) consisted of the following phases:

Phase 1: Customization, installation, evaluation, and acceptance of the new information system at each of the two pilot sites (lead counties in the first two consortia).

Phase 2: Roll-out of the system to each of the interested counties in the two pilot consortia. Roll-out of new system to each of the lead counties of each of the other six consortia.

Phase 3: Roll-out of the system to each of the interested counties in the consortia.

Using pilot test sites was considered a step for quality control of the process and had the following goals: (A) To document that the winning vendor’s software functioned the way it was represented in the company’s response to the RFP, (B) to ensure that the customization required by the RFP met New York State requirements and that the resulting system performed satisfactorily, (C) to make any additional recommendations based on actual revisions to the customized software to reflect the day-to-day operational needs of probation departments, and (D) to document that the customized software had a positive impact on departmental operations.

In addition to addressing the technical issues, both pilot counties led their consortium and were encouraged to lead meetings, provide support by way of distributing solutions to problematic processes and system functions, and involve the remaining counties in their consortium in the process of preparing for the new software.

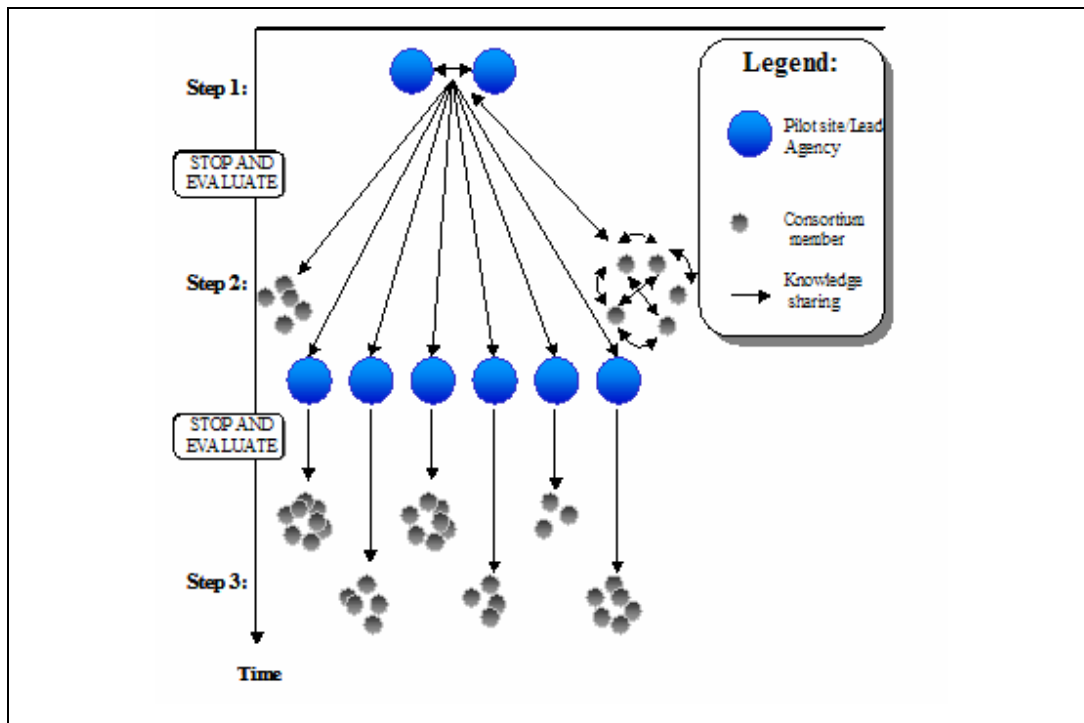


Figure 3. A Model for System Distribution

Factors contributing to the increased ACAP in a successful consortium can be identified by comparing two adjacent consortia, referred to as consortium A and consortium B. Figure 3 shows the geographical distribution of the counties in the two consortia and indicates which county probation departments adopted the information system. Although the grouping of counties was designed to create two consortia with similar characteristics, the two consortia provide a stark contrast in ACAP as evidenced by the percentage of counties beyond the pilot county in each consortium that adopted the information system (75% vs. 0%). Interviews with 35 directors and senior officers, as well as presentations, and meeting notes from the 7-year project provide a detailed view of how the consortium network form increased absorptive capacity in the successful consortium.

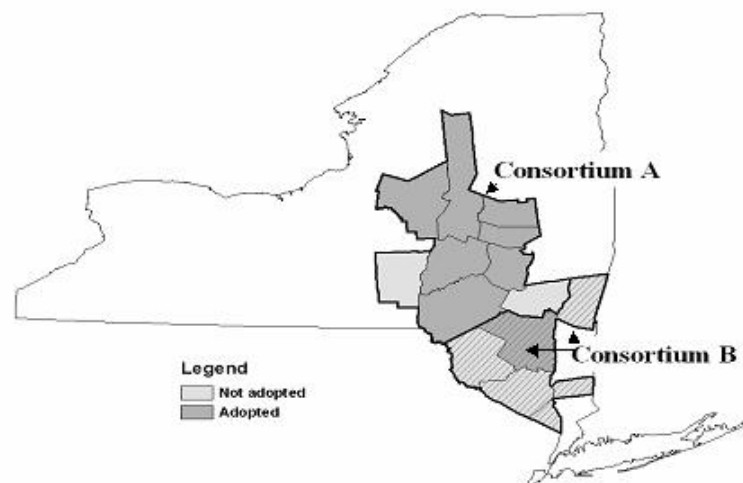


Figure 4. Adoption by Counties within Each Consortium

**Strengthening the Network**

A communications network is characterized by both *central ties* from local departments to the lead department and *lateral ties* between members of the consortium. Prior research has demonstrated that direct connections between organizations are most effective in transmission of knowledge, particularly if the knowledge is not codified as a set of formal documents (Hansen, 2002). Table 3 shows the number of central and lateral ties that existed in each consortium prior to the implementation of the network organization. In both consortia communication connections existed laterally among the local organizations and between the pilot county and local counties.

		<b>Network Degree: Existing ties of all (possible ties)</b>	
		Consortium A	Consortium B
Central ties		5 (of 8)	2 (of 5)
Lateral ties		18 (of 28)	4 (of 10)

**Table 3. Network Degree Prior to Implementation of Network Form**

In both consortia an increase in the number of ties and in the frequency of contact between departments occurred after the network organization was initiated (Table 4). In consortium A, a total of 6 formal consortium meetings were held in the 5 years after the beginning of the systems implementation, and the increase in both formal and informal connections was much greater. All eight of the other member departments of consortium A reported an increase in contact with the lead department, and roughly one third of the potential lateral ties increased. Additionally, four connections that had not previously existed were formed during the process. For two probation departments, the number of connections increased and for six departments the strength of some connections increased. In addition to the increase in number of ties, most departments reported an increase in the frequency or strength of contacts. At the global level of the entire consortium network, both frequency of communications and number of possible connections increased. In consortium A, formal meetings provide a direct means of acquiring knowledge as seen in typical comment that:

*[The consortium] creates an environment where directors can have a forum to discuss the issue, the good and the bad, about it and be able to go back to their county and make some decisions along with the people that they have to make those decisions with. I mean, that's the best piece about it, as far as I'm concerned because you go to a meeting and I can get some pretty good information about the system and then come back to my own county and say, well this is how it works, this is what it can do for us.*

		<b>Network Strength</b>	
		<b>Ties that increased in communication frequency of (possible ties)</b>	
		Consortium A	Consortium B
New Ties created	Central	3	3
	Lateral	4	0
Central ties		8 (of 8)	2 (of 5)
Lateral ties		9 (of 28)	4 (of 10)

**Table 4. Network Strength: New Ties and Increased Communication Frequency**

In contrast, no formal activities were held in consortium B after the initial planning meetings. Individual directors referred to trips to examine the software but no meetings among all consortium members were organized. Two departments with new directors reported increased contact with the lead county as a result of their new positions. Typical of comments from decision makers in Ulster was:



*"Well, I am not a regular participant in the consortia meetings. I went to one [state] meeting and I didn't have the time or the resources to get involved more actively in the consortia meetings. And [my IS] director has never been to a consortia meeting."*

No ties with other local departments were created and few of the existing ties increased in communication frequency. This weaker network was not capable of facilitating the flows of knowledge seen in consortium A.

## NETWORK PROCESSES

Although many processes influence outcomes within organizational networks, this study was focused on the interaction of characteristics and processes related to adoption of technologies. A review of the extensive literature on diffusion and adoption (Fichman, 2004; Monge and Contractor, 2003; Swan, Newell and Robertson, 1998; Rogers, 2003) revealed social and informational influence and homophily had been found to separately influence the diffusion ideas. Intuitively these processes seemed likely to be supported by a strong network and to interact, and were therefore selected for study.

### Social and Informational Influence

Social influence is the concept that individuals may be influenced by cues from others about what to attend to, how to value salient aspects of the workplace and how others perceive the same aspects (Rice and Aydin, 1991). Social and informational influence occurs through communication with management, peers, the MIS department, and friends. For example, potential adopters' perceptions are influenced by discussions and observations of the risks and advantages of system use among people they rely on for advice (Harkola and Greve, 1995). What individuals think job responsibilities mean and their past experiences with different job tasks influence perceptions, attitude formation, and behaviors (Rice et al., 1990). In addition, individuals are influenced by information regarding the objective characteristics of the work environment.

All of the adopting counties in consortium A relied heavily on other consortium members for advice and help. One director reported that the departments that impacted his decision were "probably those counties that were into the system and had initiated it and I was able to get maybe some answers from; they had some experience going through the system."

The social communication network can contribute directly to the decision process:

*"The biggest fear, and it is a major decision, whether you are going to commit your department to an automation system, either this one or that one, and whenever you can feel secure that; number one, there are other people you respect who are doing it and have made that decision, you feel a little bit better about your own decision."*

Negative social information processing can also impact members of a strong communication network. Directors who were critical of the PROBER system argued for an alternative automation system developed by a department in the eastern part of the state. This alternative system was less expensive, currently available, and purportedly met state reporting standards.<sup>1</sup> But during an extended adoption process, social influence supported by a strong network can overcome negative information and result in individuals altering their decisions. Exposure to frequent positive attitudes can overcome initial negative attitudes adopted from even respected sources. One director altered his decision when the positive comments he had heard eventually outweighed the negative comments.

*"I talked to my data processing director and the plan for us was to wait a year or so to see how the counties in the pilot project did and maybe some other counties... what they thought of it [but] I had heard enough good things about it last year [that] I went and tried to get it for our department ..."*

The stronger network in consortium A, combined with explicit and well-defined supportive knowledge and social influence, led to the spread of a generally positive attitude and greater adoption of the system. In addition, the positive social influence effectively countered the negative comments that were transferred within the network in consortium A.

---

<sup>1</sup> An independent evaluation subsequently revealed that the alternative system was subject to system crashes, did not meet state standards, nor did it allow electronic reporting.

The strong network supporting the successful consortium also assists in the assimilation of information. The following quotation is typical of the comments made by departmental directors regarding the influence of the consortium on their department's ability to assimilate new knowledge:

*I think having the consortia with a lot of us that are not terribly sophisticated computer users being able to talk to other non-sophisticated users, in a non-judgmental way...[makes it] more likely for people to improve their computer abilities. Now, I think [ ] is not very eager to use computers...we all know that, and we all try to work with her in a positive way... I can guarantee that she would not come along if she had to make a phone-call. For one thing, she is going to fear that she is not going to understand the answer. If I have worked through the problem and have an answer, I can explain the answer in a way that they understand. I think that is a big benefit, and I think it works that way. Plus, we also know the implementation issues. A lot of the implementation issues between probation departments are different than for example between probation and mental health. If we were in a computer user group with social services type of people, the issues would be totally different.*

### **Organizational Similarity -- Homophily**

Homophily is the tendency for organizations to engage in direct contact with other organizations they view as similar. The selection of others who are similar "is thought to ease communication, increase predictability of behavior and foster trust and reciprocity" (Brass, 1995) and is a motivation for communication and knowledge sharing. In addition to motivating direct contact, organizations may mimic the attitudes, beliefs and behaviors of other organizations viewed as similar. In the Schoharie consortium, directors observed that departments they viewed as similar to their own were assimilating the technology and concluded that they could also learn and adopt the system.

*A couple of other small counties that said that they were working in it, which helped me to believe that maybe we could do it then. [County X] is kind of a big county, [County Y], they had a computer person who was so good. So, you look at those kinds of exceptions, but then I saw a couple of the smaller counties and the directors said "oh, I don't have any computer knowledge at all, and we're working with it and we're doing it.*

*You learn so much more by doing things with the people you work with, and for the most part the consortium that we were involved with was very demographically similar to us. If we were involved in a consortium with say [counties X, Y, Z], we wouldn't have anything to do with it, because they are all huge departments, they are monstrous compared to us.*

The similarity between the lead county and the member counties is particularly important:

*With [lead county] being similar to us, we all had the same problems and we all had the same solutions, or we could all work together to get the same solutions without worrying about the different kinds of problems that a bigger county would have.*

In contrast, directors in the Ulster consortium were far more ambivalent about the project and reported vague comments about what they had heard (e.g. "some people like it and some didn't like it"). Even in cases where they reported hearing positive attitudes, they included a negative counterpoint, such as wanting to wait until the bugs were fixed, expressing concern that the system wouldn't support departmental processes, or worry that the system was too complex, inflexible or limited in function. There was also concern about the success of the software and doubt about future support. Not surprisingly there was far less enthusiasm for adopting the Prober system.

### **INCREASING ABSORPTIVE CAPACITY**

The interactions of network strength, social and informational processing, and homophily create an network environment in which absorptive capacity is increased at the organizational level. Surprisingly, we observed that ACAP is composed of both dynamic components and fixed components (Figure 4). Organizational elements that can be transferred through a social communication network comprise dynamic ACAP. The mobility of dynamic ACAP through a network differentiates it from fixed ACAP, which resides within the organization and is more difficult to share.

	<b>Element of ACAP</b>	<b>Increased by:</b>
Dynamic ACAP	New Knowledge	Technical solutions; transformed business procedures; "who knows what?"
	User Computer Experience	Formal training; "Train the Trainer"; availability of support from member organizations
	Information System department support	Negotiation strategies; sharing technical support; customized manual
Fixed ACAP	Prior use of similar systems	Consult consortia members experiences
	Obtained hardware prior to software	Positive attitude/support from management leading to hardware purchase

**Figure 4. Dimensions of Absorptive Capacity**

In addition to providing motivation for a system adoption, dynamic ACAP enabled departments with weaker technical skills to implement and begin to use the system. The knowledge of "who knows what" in the network enables consortium members to readily acquire knowledge they are missing. A senior officer in the consortium A provided a typical example of cross-department support when she stated: "But I deal with the counties all over, anyone who has a question about the system and [my director] has been willing to send myself and [my co-worker] to go anywhere that people need assistance."

Formal training by the vendor and a program of training employees who can then train and support their peers ("train the trainer"), aid consortium members in assimilating the new information. New knowledge in the form of technical solutions to software problems and changes in business practices to exploit the system can reduce implementation problems and encourage transformation of business practices and utilization of the information system to support core functions. Negotiation strategies between probation directors and county IS departments also increased the support for system adoption and enabled sharing of technical support. Other resources, such as a custom user manual written by knowledgeable probation officers with probation-specific expertise, contribute to the elements of ACAP that can flow across the network.

Dynamic ACAP interacts with and increases both network strength and social influence as other members of the consortia see that there is knowledge and support available in the network. This positive feedback serves to further facilitate increasing ACAP for all members of the consortia.

*I think what the consortium does [is] it gives the other probation directors some kind of feeling that there are other people out there willing to help them out when they are having a problem....and, then when you need it, those people are there and you can call on them for help; it makes you more willing to be a willing participant in the process.*

Fixed ACAP, which resides within the organization, is more difficult to share directly. Although it is not possible to increase an organization's prior experience with information systems, they can rely on others' experiences if communication is supported. Similarly obtaining management support prior to committing to system adoption can increase accessibility to the necessary hardware.

## CONCLUSIONS

This research identifies the interaction of network form, social communication processes, and organizational homophily, and shows that strong and dense communication networks enhance absorptive capacity in member organizations and in the network. ACAP can be increased to meet the challenges of knowledge-intensive programs, by the selection of network forms that create strong networks and facilitate knowledge sharing. The data indicate that the county departments in the active consortium were able to increase their absorptive capacity. The consortia-based network organizations supported specific knowledge sharing and collaborative activities. In the active consortium a strong and dense social communication network was developed. In turn, the network enhanced the transfer of social and informational influence, attitudes, and behaviors as well as dynamic absorptive capacity.

Initially formal meetings of the network organization form the basis for the creation of formal and informal social communication ties which increase network strength and degree. This network interacts with two processes: social information processing and homophily. Multiple network ties and frequent communication result in high exposure to social and informational influence regarding the strategic goals of the organization. Strong networks provide a variety of sources of influence and increase the frequency of exposure to information by supporting the flow of knowledge and skills through the consortia. As a result, negative attitudes and information may be displaced. In this regard, lateral ties between the consortium members are more important than central ties to the focal organization in giving access to knowledge. Formal structures and routines for knowledge sharing can insure that new external knowledge is routed to the appropriate people and organizational areas. Organizations are also more likely to form communications ties and be influenced by other organizations they perceive as similar to themselves. These social processes act to increase network strength among organizations that are influencing each other and view each other as similar.

Social processes can also increase a dynamic aspect of absorptive capacity. By transferring knowledge, implementation procedures, problem solutions, technical help and other support, organizations can increase the capacity of network members to acquire, assimilate and exploit new knowledge. The existence of support in the network can increase the willingness of member organizations to acquire and work with new knowledge. This extension of the ACAP construct across organizational boundaries supplies a mechanism by which organizations can transfer strategic initiatives across organizational boundaries. In groups of autonomous organizations, the fixed ACAP of a specific member can be enhanced by dynamic ACAP from other members.

## REFERENCES

1. Zahra, S. A. and George, G. (2003) Absorptive Capacity: A Review, Reconceptualization and Extension. *Academy of Management Review*, 27(2): p. 185-203.
2. Cohen, W. M. and Levinthal, D. A. (1990) Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35: p. 128-152.
3. Matusik, S. and Heeley, M. B. (Forthcoming - 2005) A Multilevel Theory of Absorptive Capacity in the Software Industry. *Journal of Management*.
4. Taylor, S. and Todd, P. (1995) Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, 19(4): p. 561-570.
5. Baker, W. E. (1992) *The Network Organization in Theory and Practice*, in Networks and Organizations: Structure Form and Action, N. Nohria and R.G. Eccles, Editors, Harvard Business School Press: Boston, MA. p. 397-429.
6. Powell, W. W. (1987) Hybrid Organizational Arrangements: New Form or Transitional Development? *California Management Review*: p. 67-87.
7. Dawes, S. S., Pardo, T. A., Green, D. E., McInerney, C. R., Connelly, D. R., and DiCaterino, A. *Tying a Sensible Knot: A Practical Guide to state-Local Information Systems*. 1997, Center for Technology in Government: Albany, NY.
8. Hansen, M. T. (2002) Knowledge Networks: Explaining Effective Knowledge Sharing in Multiunit Companies. *Organization Science*, 13(3): p. 232-248.
9. Fichman, R. G. (2004) Going Beyond the Dominant Paradigm for Information Technology Innovation Research: Emerging Concepts and Methods. *Journal of the Association for Information Systems*, 5(8): p. 314-355.
10. Monge, P. R. and Contractor, N. (2003) *Theories of Communication Networks*, New York:: Oxford University Press.
11. Swan, J., Newell, S., and Robertson, M. (1998) *Inter-organizational Networks and Diffusion of Information Technology: Developing a Framework*, in Information Systems Innovation and Diffusion: Issues and Directions, T. Larsen, Editor, Idea Publishing: Hersy.
12. Rogers, E. (2003) *Diffusion of Innovations*. 5 ed, New York: Free Press.
13. Rice, R. E. and Aydin, C. (1991) Attitudes toward New Organizational Technology: Network Proximity as a Mechanism for Social Information Processing. *Administrative Science Quarterly*, 36(2): p. 219-244.
14. Harkola, J. and Greve, A. (1995) Diffusion of Technology: Cohesion or Structural Equivalence? *Academy of Management Best Paper Proceedings*: p. 422-426.
15. Rice, R. E., Grant, A., Schmitz, J., and Torobin, J. (1990) Individual and network influences on the adoption and perceived outcomes of electronic messaging. *Social Networks*, 12(1): p. 27-55.
16. Brass, D. J. (1995) A social network perspective on human resources management. *Research in Personnel and Human Resources Management*, 13: p. 39-79.