Dynamic Adaptation for Improved Health Care Delivery

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April 2012

Abstract and Specific Aims

Despite considerable knowledge generated in organizational studies and social network analysis in how organizations work, yet to be developed are dynamic and scientific user-friendly ways of helping organizations, and their internal teams, adapt. At one extreme of efforts to help teams adapt are complex models, contracted research and evaluation, and attempts to implement findings. At the other extreme are motivational speakers whose impact is often superficial, short-lived or unsystematic in impact. This SBIR project “Dynamic Adaptation for Improved and More Efficient Health Care Delivery” proposes development of a practical online software toolset that enables health care organizations to efficiently collect team structural and process data, generate actionable information, apply the results, and track results of their activities in order to improve care and lower costs.

Activities within the realm of health care quality and safety to understand the coordination of care (e.g., Care Transition Model, Guided Care Model, Virtual Integrated Practice Model). A more generalized and very powerful approach for improving how health care delivery units perform is the concept of relational coordination. Relational coordination focuses on communication that is frequent and timely and accurate and focused on problem solving for teams while emphasizing shared goals/knowledge and mutual respect. This concept is simple enough to allow for organizational self-examination that can engender adaptive change, yet also provide systematic understanding of organization baseline and trends. However, to reveal key patterns in relationships in such processes of collective action, and also how relationships relate to the content and tempo of communication, we propose to leverage the power of Social Network Analysis to fully engage the many intricacies of health care teams and their communications to allow them timely and interactive feedback. To this end, the Phase I Specific Aims are:

Aim 1. Carefully map the existing state of the art in Relational Coordination onto techniques of Social Network Analysis.

Aim 2. Implement a prototype online software tool TeamLinks for health care delivery teams using Social Network Analysis techniques to implement Relational Coordination.

Aim 3. Evaluate the usability and utility of the prototype TeamLinks online tool, including the extent to which software can be made generalizable yet flexible enough to handle the various issues that health-related organizations face.

Based on our experience developing social network analysis software (e.g., EgoNet, VisuaLyzer, SocioWorks), we will build the software to allow the measurement of existing interpersonal and inter-unit relationships and interactions (i.e., social network ties) to be visualized and analyzed in customizable combinations together. Both the content of social networks (i.e., types of people and types of relationships) and the structure of social networks (i.e., the patterns of ties within a network) will be explored and engaged via the proposed software TeamLinks.
This software will help make organizational adaptation an integral part of quality health care delivery, not just an activity undertaken occasionally or directed from the outside. All health care deliverers would be able to use the tool and benefit from it, as it will be focused on team delivery of care, not just on delivery of care and not just on team dynamics. Hospice care organizations have already expressed interest in the idea, as have researchers working with hospitals.

A. Significance

This Phase I SBIR proposal “Dynamic Adaptation for Improved Health Care Delivery” will develop a prototype online software that allows organizations to collect data on their activities in order to improve health care delivery. Despite considerable knowledge generated in organizational studies and social network analysis in how organizations work, dynamic and scientific user-friendly ways of helping organizations adapt do not exist. It takes time for to find researchers or consultants, develop a contract and statement of work, evaluate an organization’s need for process improvement or structural change, and then report on the results and then discuss the results—which then often requires revisions to the statement of work. At the other extreme on the scale of systematic efforts at process improvement, bringing in motivational speakers provides some behavior change, but the organization in that case collects no information about itself and thus does not really know where it has moved from or to, nor which part of its organization did the moving or specifically how.

A relatively new and powerful tool for seeking to improve how health care delivery units work is the concept of relational coordination—focusing on communication that is frequent and timely and accurate and focused on problem solving in the context of having shared goals and knowledge plus mutual respect (Gittell 2010). This concept is simple enough to allow for organizational self-examination that can engender adaptive change, yet also provide systematic understanding of organization baseline and trends. Led by Gittell and supported by Brandeis University is the related Relational Coordination Research Collaborative. Relational Coordination is a major research, evaluation and translational effort with momentum even in the field of coordination of health care and services (e.g., Gittell et al. 2000, Gittell and Weiss 2004, Gittell 2010, Frankel 2011). A primary focus of Gittell’s work has been on how to find weak links in the system of communication, and then strengthen those weak links to improve quality and efficiency in the delivery of care.

Coordination occurs within and across institutions, and even between broader realms of service—medical care and physical therapy, or the justice system and mental health, or social services and health care provisioning. By removing boundaries to efficient and effective communication and shared goals, more of the focus can be placed on providing care, and perhaps even on providing care in a way that is more personalized and in concert with the Patient Centered Medical Home model proposed by several physicians groups to improve care coordination.

Building on the understanding that communication and shared understandings are fundamental aspects of positive organizational change, we propose to evaluate the extent to which software incorporating metrics of Relational Coordination but also including measures between individuals for Social Netowkr Analysis (SNA) can be made generalizable yet flexible enough to handle the various issues that organizations face. In this case, we will build the software to allow the measurement of actual interpersonal and inter-unit relationships and interactions (i.e., social network ties) to be visualized and analyzed in customizable combinations together.
Market: All health care deliverers would be able to use the tool and benefit from it. Initial market efforts will be focused on hospitals, multi-physician practices that coordinate care of a patient, assisted living facilities, and home health care organizations. Hospice care organizations have already expressed interest in the idea, as have researchers working with hospitals. Partnering with the Relational Coordination Research Collaborative will put this software squarely in the domains for which it is intended, including large businesses and governments.

Objectives for Phase II Submission: A Phase II submission will solidify the software model by deploying the software with two to four health care institutions. These will include hospitals working with the Armstrong Institute for Patient Safety and Quality at Johns Hopkins University, and also will include Hospice of the Chesapeake. Phase II aims will also focus on diverse reporting capabilities, increased interactive capability for team members, flexibility of use in other domains, and initial testing variation in results from pilot teams.

B. Innovation

This software will help make organizational adaptation an integral part of quality health care delivery, not just an activity undertaken occasionally or directed from the outside.

It is still the case, as Benham-Hutchins (2008) found, that we are still at the beginning of understanding how fundamentals of communication can be supported well by health information technology. Within the realm of care delivery quality and safety to understand the coordination of care from a cost management perspective, Uddin and Hossain (2011) employed a social network analysis and found that higher levels of in-person visits, especially of doctors to patients at other hospitals, required higher costs. However, Benham-Hutchins (2008) actually talked to these professionals, and found they all preferred verbal communication in person or by phone over electronic or paper charts. Nonetheless, variation does exist in degree of preference for electronic chart, paper chart, phone, or in person communication. Benham-Hutchins’ example of interpersonal communication networks is that of the patient hand-off that involves multiple professions including doctor, charge nurse, primary nurse, pharmacist, respiratory therapist, resident, intern, social worker and specialist doctor, and involved the use of social network analysis to examine the roles of certain kinds of job titles/positions in these intra-professional and inter-professional hand-offs, including the various measures of individual and network centrality. For her question “Are healthcare providers satisfied with the effectiveness of current communication methods,” she showed that different units have different expectations and levels of satisfaction with communication. Again, they mostly preferred verbal communication. Reasons for verbal communication include number of errors in paper charts, preference for having patient be able to understand the handoff. However, shift changes and availability of personnel within and across shifts do not also allow verbal handoffs. As Alvarez and Coeiera (2006) also found, both synchronous and asynchronous manners and technologies for communicating are being activated at the same time in many settings. Thus, attention in development of the proposed software must include mechanisms for supporting appropriate verbal communication, paper communication, and digital communication depending on the setting. Using network analysis approach to relational coordination will allow for pinpointing appropriate methods and solutions for specific relationships, handoffs, and interactions.

It has been argued that in some domains regular face-to-face meetings are necessary for continued effective relational coordination (CITE). The basic human tendency to prefer to ‘hear it from the horse’s mouth’ presents a challenge for health information technology, which typically is engaged via form entry or mouse clicks through desktops/laptops via desktop-installed software or web-based software, or via
personal device assistants or smart phones. In addition to investigating how to provide user-friendly mechanisms for social network visualization and analysis so that organizations can examine how they handle hand-offs or inter-unit tasking of responsibilities, our Phase I activities will include evaluating design that provides voice communication most easily and efficiently via health information technology, for when people are not standing face-to-face or are not both on their phones.

Organizational adaptation can be thought of as one step broader than the various new exciting health information technologies used to provide care, such as the coordination of patient care (e.g., eQSuite™) or the self-reporting of symptoms to the care team (e.g., Tel-Assurance®, as well as our own Tell Us Pro® software). The process of organizational adaptation helps in the understanding of what kinds of tools, including software, can best be applied to meet the organization’s needs in providing care. The use of health information technology for better coordinated care means fewer unnecessary risks to patients, and reduced medical costs, and has been strongly advocated by the Institute of Medicine (2001, 2004) for a decade.

The health care setting has received less focus in managerial emphasis for efficiency and productivity than have some other sectors of business, particularly those that produce informational and service products. There are unique challenges in the health care setting compared to these other sectors of business. Principally, most interactions with patients might not be characterized as typical, whereas business customers in most fields have very typical occasional needs for a service/product or have long-standing contracts for regular maintenance of a technology or infrastructure like air conditioning or desktop computers on contract.

Health care services are often less consistent in regularity or even the degree of certainty that can be applied to any case than are most non-medical repair and maintenance services. Certainly, such repair services can be seen as similar to some health care needs (e.g., dialysis). But the standard experience of a customer of any repair or household maintenance service is not to get all of their products and repairs and maintenance from the same business and certainly not to have those services coordinated in any systematic way (exceptions might be Sears for services, and HMOs for health care). However, it is more and more the case that patients need multiple medical institutions and units within them to interact with one another to provide coordinated care to improve outcomes and to reduce costs. Helping health care institutions do this is the goal of the Patient Centered Medical Home and is the focus of this SBIR Phase I proposal.

Table 1 shows the main components of relational coordination, example questions that can be asked to measure in many different ways the strength of a relationship tie—either between individuals or between groups—in order to determine structural measures that indicate how dense, centralized, open, connected and comprised of unique bridges or subgroups a network is. In fact, Table 1 provides seven different measures which could be used to look at seven different networks, i.e., seven different processes involved in effective relational coordination. Work by Gittell and others has produced considered insight into how to make organizations more effective and efficient, and we expect that the use of a Social Network Analysis toolset to implement these techniques in the evaluation of health care delivery will tell us where and with whom to focus efforts to not only strengthen ties but, if necessary, circumvent ties, make use of duplicate pathways, develop new ties, or re-purpose existing ties to serve a different purpose—such as expecting colleagues to focus on a different or additional component of relational coordination in order to build trust and confidence.

Table 1. Measuring Relational Coordination (after Gittell 2009)
<table>
<thead>
<tr>
<th>Relational Coordination Component</th>
<th>Example Question for Data Collection</th>
<th>Potential Insights We Propose from Using a Social Network Analysis Approach with Individual Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent Communication</td>
<td>How frequently do you communicate with specific people in each of these groups?</td>
<td>Is there sufficient duplication in bridging, or are there unique bridging people in terms of frequent communication?</td>
</tr>
<tr>
<td>Timely Communication</td>
<td>Do people in these groups communicate with you in a timely way?</td>
<td>Are there gates through which timely communication must past and can be held up? Where are the efficient ways around these gates when they get blocked?</td>
</tr>
<tr>
<td>Accurate Communication</td>
<td>Do people in these groups communicate with you accurately?</td>
<td>How do role and position together interact to affect accuracy?</td>
</tr>
<tr>
<td>Problem Solving Communication</td>
<td>When a problem occurs, do the people in these groups work with you to solve the problem?</td>
<td>Who are influential people or influential roles or third persons that could be engaged to help engender working together?</td>
</tr>
<tr>
<td>Shared Goals</td>
<td>How much do people in these groups share your goals?</td>
<td>What positive in-group/out-group identities and dynamics can be supported to improve perception of common goals?</td>
</tr>
<tr>
<td>Shared Knowledge</td>
<td>How much do people in each of these groups know about the work you do?</td>
<td>Where are the network paths that impart information about specific work roles?</td>
</tr>
<tr>
<td>Mutual Respect</td>
<td>How much do people in these groups respect the work you do?</td>
<td>Does network role and position affect respect? How convergent are institutional map of hierarchy and actual informal information and interaction networks.</td>
</tr>
</tbody>
</table>

The example questions in Table 1 are flexible and can be used to ask about procedures and processes used, but also the same questions can be used to ask about the characteristics of the people being served or cared for. If two versions of each of the seven questions are asked for the same study, that generates twice as many networks, or 14, each potentially with unique contributions to the effectiveness and efficiency of the organization.

C. Strategy

The software base and the software development process at Medical Decision Logic allows’ for rapid development of an appropriate data model to accommodate the intriguing nature of organizational adaptation. This is a social network data model, but it is a multi-layered social network model that can involve an institution, its departments and its units, and perhaps several sites for the institution such as multiple hospitals or multiple practices. This model will cover interpersonal as well as inter-unit relationships and interactions. Hierarchical role and responsibility assignment is common in medical software and is part of many of Medical Decision Logic, Inc.’s products. However creating many and varied connections between these units requires something different from a standard social network model and certainly something different from an institutional hierarchy model. Each hospital or department or unit can be a node or it can have many nodes within it (and many nodes within those nodes).
This structure of this tool in our first exploration of it will be a web tool that can be customized in terms of team membership, team size, and member roles. There will also be a very user-friendly way to map out ideal interactions between team members, based on the functions and interface of VisuLyzer social network analysis software that is a current desktop-installed program. The organizational adaptation tool will then allow the user to measure and visualize existing interactions of team members and then compare that social network to the ideal model in order to show degree to which each of these types of interactions is occurring or not occurring.

Fundamental to understanding how organizations thrive or fail is the nature of the coupling between the nature of team members’ relationships and the pace and content of their communications (Gittell 2010).