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Collaborative Networks

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Abstract

This paper proposes a business model based on the concept of organizational collaboration. The key to this model is the "information and organization mediator (IOM)" an entity charged with the responsibility of facilitating the coordination of research efforts and the sharing of data, information and knowledge among different partners in a network. We will demonstrate this concept of "collaborative networks (CN)" in the context of a hypothetical health care company engaged in the development of a microarray (gene-chip, http://www.gene-chips.com/).

Keywords: Networking, collaboration, mediator, health-care, microarray

Introduction

In today's highly competitive business environment, many firms have discovered the benefits of collaboration. Industries such as steel and chemicals have learned that participation in knowledge sharing networks such as e-steel and Chemdex can dramatically improve performance. No where, however, are the potential benefits of collaboration greater than in knowledge intensive industries such as health care and biotechnology.

In the health care industry it can cost as much as $1 billion and take up to ten years to bring a drug or diagnostic product to market. Unfortunately, such expenditures do not guarantee success. While health care companies have collaborated to reduce costs (e.g., sharing sales forces), they have been reluctant to share knowledge that results from the development and exercise of core competencies. While participation in knowledge networks can significantly reduce the costs and risks associated with drug development and help ensure an acceptable measure of profitability, overcoming the traditional competitive business mindset will not be easy.

In this paper we will examine the problems that most health care companies face today, especially as they attempt to develop critically needed drugs for highly mutable diseases such as HIV and HCV. We propose a solution, the *information/ organization mediator (IOM)* as a way of helping firms in the health care industry deal with the problems of information overload as well as the problems that result from their attempt to participate in collaborative knowledge networks with firms from a variety of disciplines. We will discuss our proposed solution in the context of a hypothetical case and propose ways to help implement the proposed business model.

The Health Care Industry Today

Today, diagnostic and research laboratories using automated high throughput technologies are generating large volumes of diverse and complex biological data needed to develop diagnostic tests and possible solutions to heretofore incurable, diseases. Even sophisticated health care firms such as Roche and Novartis are overwhelmed by such an abundance of data. In order to cope with so much data these firms will need to have access to the knowledge and resources possessed by information technology firms. In addition, because data for highly mutable diseases such as HIV has a very short shelf –life, it will require that firms continually reassess their data needs as well as the temporary collaborative arrangements from which they acquire the appropriate data.

Managing such a network presents a number of problems not the least of which is the need to assure a level of transparency so that each actor can be certain that their contributions are properly valued and that they will be properly compensated.

Organizational Forms of Networks

Traditionally, the organizational structures literature has made the assumption that there is one single best structural form (divisional, matrix, etc.) for a particular organization. As the digital economy continues to evolve, newer organizational forms will be needed, ones built upon a collaborative business model. In the digital economy collaboration has become absolutely essential because in this 24/7 economy, knowledge is everywhere and growing at an exponential rate. No one firm can create all the knowledge it needs to meet the challenges of a highly competitive global economy where customers demands for innovative products and services seems insatiable. The interorganizational relationship literature argues in favor of such arrangements (Litwak 1961; Hall 1962; Heydebrand 1990; Stinchcombe 1990). It discusses the possibility of networks with no or multiple structural forms (Borys and Jemison 1989; Barley 1990; Holland and Lockett 1997; Miles, Snow et al. 1997; Ahuja and Carley 1999; Oliver 2000) where people's needs and practices determine the organizational structure (Sewell 1992 p. 4). The collaborative network model can be viewed as a hybrid model of two forms, the starburst and spider's web.

The Starburst

The Starburst is an organizational form that is most appropriate when there is very specialized and valuable knowledge at both the nodes and the center network. Starbursts are common in creative organizations that constantly peel off more permanent, but separate, units from their core. These spin-offs remain partially or wholly owned by the parent; they can raise external resources independently, and are controlled primarily by market mechanisms.

In operation, the center retains deep knowledge of some common knowledge base. The nodes – essentially separate permanent business units – have relationships with given marketplaces and are the locus of important, specialized market or production knowledge. The flow of knowledge is typically from the center toward the outer nodes. The organization rarely transfers knowledge from one node to another, but feeds back to the core specialized information that other nodes may find useful.

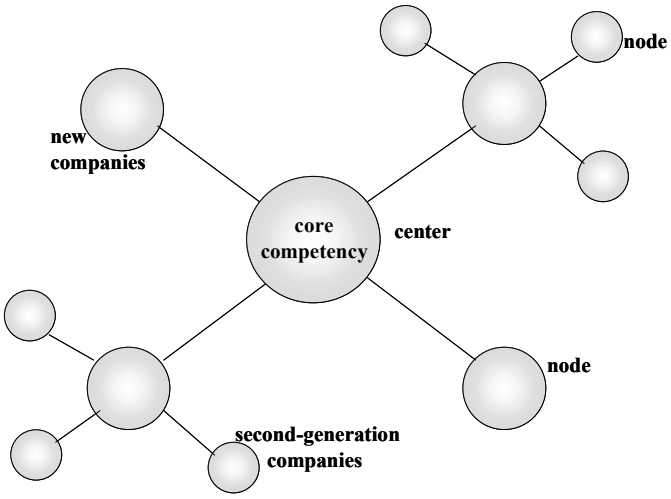

Figure 1. Centralized Starburst (Quinn 2000 pp. 19-21)

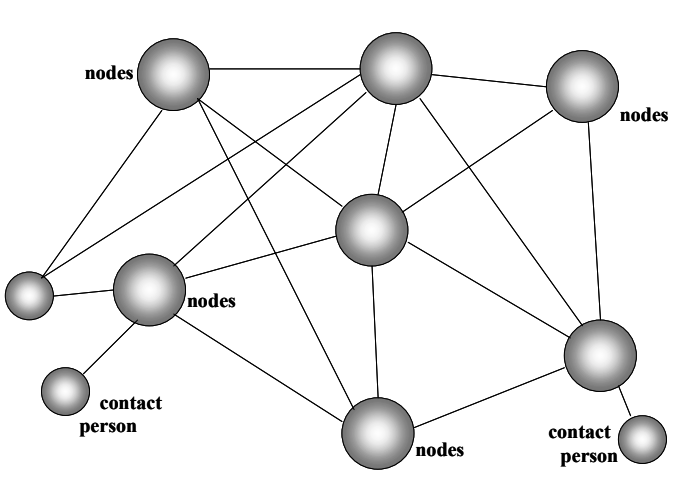

Figure 2. Decentralized Spider's Web

The Spider's Web Organization

In a spider's web, there is often no intervening hierarchy or order among nodes and it is hard to define where the center is. The locus of intellect and knowledge is highly dispersed, residing largely in contact nodes. However, the focus is a project or problem that requires the nodes to interact intimately or to seek others who happen to have the knowledge or special capabilities that a particular problem requires.

The organization's intellect is essentially latent and under-utilized until a project requires that people make connections with one another. Information linkages are quite complex, and intellect flows from many nodes to many others. Nodes typically collaborate only temporarily in delivering a specific service or solution in project form to a particular customer. On a given project there may or may not be a single authority center. Often decisions will merely occur through informal processes if the parties agree. The spider's web offers unique advantages provided that it can simultaneously support high specialization, multiple geographic locations, and a disciplined focus on a single problem.

Collaborative Networks Organization

Collaborative networks are a combination of the starburst and spider web forms. Such a network is a highly centralized spider's web where data, information and knowledge are managed through an information and organization mediator. The mediator is responsible for helping manage the data produced by the various partners in the network, and for ensuring a level of network transparency so that the partners can be assured that their contributions are properly recognized.

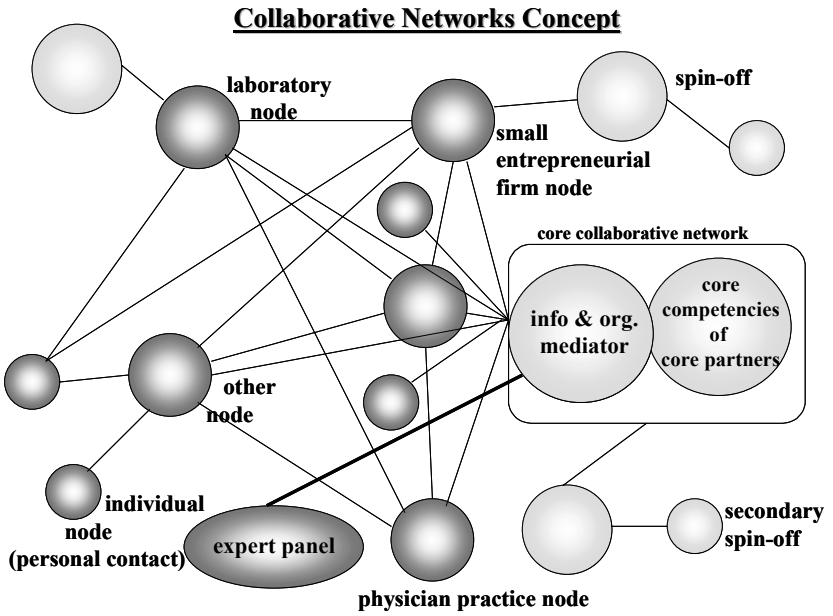

Figure 3. The Concept of Collaborative Networks

The network nodes represent individuals, small or large groups, existing companies, sets of entrepreneurial firms and other contributors. They have in-depth knowledge about a small or large part of a collaborative project. Knowledge is dispersed among all the autonomous participants. The flow of newly created data, information and knowledge goes to the centralized information and organization mediator. The central network node coordinates the distribution of instructions to the outer nodes to fulfill project tasks without revealing trade secrets.

The benefits of a collaborative network organization can be summarized: 1. It is the locus of innovation utilizing newest knowledge for a particular project, 2. It seamless integrates information and expert knowledge, 3. It is highly flexible in creating new alliances and building virtual arrangements.

Case Study: A Hypothetical Collaborative Network for the Development of Microarray

Situation of the Health Care Industry

The mantra for companies in the 21st century is "innovate or die". This has become especially true in the health care industry, where independent biotechnology research doubles the knowledge available every 18 months adding 100 gigabytes per day to the databases of the GenBank alone (Burks 1990). Unfortunately, no one company can hope to keep ahead of such an abundance of knowledge by itself. To prosper in this environment companies will need to systematically tap the capabilities of external knowledge sources, not just for state-of-the-art products and services but also for the continuous innovations and the evolution of ideas (Quinn 1999). This can be explained by looking at a hypothetical health care company engaged in the development of microarrays (gene chip).

Partners and Participating Stakeholders

A critical success factor for a collaborative network is to have partners with not only the financial strength but also with the competencies to support new product development and to ensure access to the market. In the case of the development of a microarray, at least five kinds of knowledge sources have to work together (see Figure 4). Each company has core competencies that can not be imitated or matched in a cost-efficient or short time manner by other companies. These partners are:

1. a health care (pharmaceutical/diagnostic) company (e.g. Quiagen, Roche Diagnostics);
2. a microarray manufacturer (e.g. Affymetrix, Caliper);
3. an information and organization mediator (IOM) facilitating the integration of data, information, knowledge, and technology on a collaborative network platform;
4. hospital and research laboratories around the world; and
5. expert panel, which is integrated within the IOM)

The conceptual network presented here can be thought of as consisting of two different levels. On the first level we find a health care company a microarray manufacture and the IOM. The health care company provides financial strength and market access. The microarray manufacturer provides core competence in the production of the microarray. And most importantly, the information and organization mediator (IOM) provides an information and communication technology (ICT) platform through which all the information sharing is handled.

The novel feature of this model is the IOM and its integrated expert panels. The IOM is responsible for the acquisition of information and knowledge generated by institutions and individuals. The IOM has the responsibility to organize and allocate assignments and to provide the adequate IT infrastructure for each participant on the second level. The IOM must have the ability to integrate data, business processes, and core competencies of the different partners. This is facilitated through a dynamic, virtual web-based arrangement.

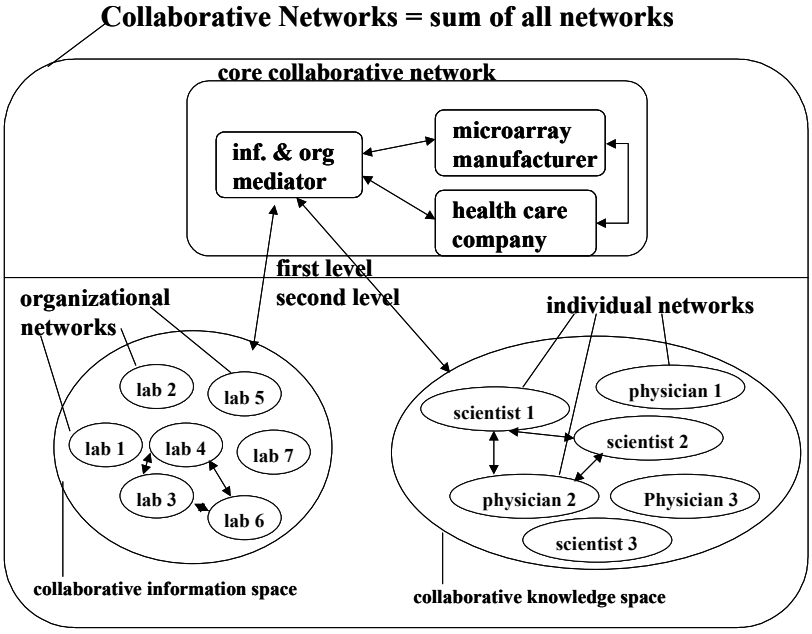

Figure 4. Conceptual Structure of Collaborative Networks for Microarray Development

The diagnostic laboratories are responsible for constantly delivering the newest information of diagnosed organisms needed to improve the quality of the information on the microarray. The laboratories are organized, managed and financially rewarded through the IOM. Experts in the field evaluate the raw data generated by the laboratories. Their task is to evaluate the information and to determine how it can be used for product development. By fully utilizing the integration of the different core competencies, the mediator can help lower the costs and risks associated with bringing a new product to market. Laboratories in the network deliver test results to the IOM, but do not necessarily have access to other participant's data. If the expert panel or a mutual institution deems the contribution of a laboratory to be valuable then the laboratory will be reimbursed.

Conclusion

In the rapidly developing field of biotechnology, the knowledge base is complex, dispersed and rapidly expanding. Due to the high uncertainty of the environment, organizations interact more with external parties in order to gain access to both knowledge and resources. Hence, the locus of innovation will be found in collaborative network arrangements, rather than in individual firms.

The collaborative networks model is a vehicle for producing, synthesizing, and distributing ideas. Learning in these circumstances is a complex, multi-level process, involving learning from and with partners under conditions of uncertainty. Learning about partners' behavior and developing routines and norms might mitigate the risks of opportunism over time. In fields, such as biotechnology, firms and networks must have the ability to absorb knowledge (Nelson and Winter 1982; Cohen and Levinthal 1990; Brown and Duguid 1991). In short, internal capability and external collaborations are complementary. Internal capability is indispensable in evaluating ideas or skills developed externally, while collaboration with outside parties provides access to news and resources that cannot be generated internally. Collaborative networks serve as the locus of innovation in many high-tech fields, because it provides timely access to knowledge and resources that are otherwise unavailable, while also testing internal expertise and learning capabilities (Powell 1998 p. 229-231).

The reason why an IOM is so important is that companies do not have the ability to properly manage collaborations, which in part may explain, why 60% of joint ventures and strategic alliances fail after a short time. Collaboration on the other hand delivers access to new knowledge, external competencies and resources. Bundling knowledge, competencies and resources of different partners will open new business opportunities that firms would be unable to exploit alone. Given the paradox of competition and collaboration we contend that collaboration is the new paradigm appropriate for the knowledge intensive digital economy.

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