

A Simulation Model of the Effects of Technology on Organizational Knowledge

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Consulting firms and other knowledge-intensive organizations leverage a single asset: the collective learning and knowledge of their staff. They collect, retain and disseminate skills, best practices, and project histories as they market and deliver services to clients. In the past these activities were performed through a combination of written documents and formal and informal relationships among the staff over time. Electronic mail and, more recently, groupware tools have emerged to store and access these knowledge documents. Through these tools, firms may grow repositories of corporate experience and encourage new information sharing relationships (Orlikowski 1995).

What are the incentives and disincentives to participate in groupware-facilitated information sharing and learning? If there are limits to how and when individuals use the technology, then these limits may put a ceiling on the benefits reaped in the aggregate by the firm. There may also be strategic and tactical implementation choices that may reduce the effects of disincentives.

Research Background

This study of groupware and organizational knowledge begins with the effects of the simplest and most widespread computer-based collaboration technology, electronic mail. Sproull and Kiesler (1991) described two major positive results from electronic mail: increased staff efficiency and increased staff effectiveness. The first affect the efficiency of individuals acting in the firm: electronic mail provides faster, easier access to information. Others have also provided a strong economic rationale for implementing electronic links between individuals and between firms (Davidow and Malone 1992) even though these effects, as with many other IT innovations, are often hard to quantify (Brynjolfsson 1993).

There is also a deeper, secondary effect of electronic mail, the growth of interrelationships and dependencies within the firm. Sproull and Kiesler (op. Cit.) believe that electronic mail changes social structures, relationships, and information access to make the individuals in the firm more effective. These changes, enabled by the technology, are perhaps more important and more pervasive than the efficiency effects. Communication technologies allow people to pay attention to different things and different people that had escaped their attention in the past. The positive effects of coordination, reduced redundant reporting, and improved general awareness influence the members of the firm and improve their collective work over time.

This secondary effect of technology-enabled organizational change is, in their model, "deviation-amplifying" or self-reinforcing. That is, as individuals use electronic mail they develop new relationships and ways of looking at problems that assist them in their tasks, and that in turn create incentives for further communications. From a systems thinking perspective (Senge 1990) there is a positive feedback loop in place that stimulates further use of technology.

Are there also deviation-reducing effects, counter-balancing forces or limitations on the system surrounding the participants that constrains their use of electronic communication over other media? The literature on electronic mail and IT adoption provide several examples. Individuals may suffer from information overload (Sproull and Kiesler, op. Cit.). They may choose not to participate in the technology because the technology is perceived as too complex, or is not considered personally efficacious (Hill, Smith, and Mann 1987). At the personal and organizational level there may be resistance to information sharing (Constant, Kiesler, and Sproull 1994), or the changes in existing social structures (Orlikowski 1992). All of these effects create negative feedback loops that constrain or reverse the enabling effects of the technology.

Dissertation Topic

This dissertation will develop a model of the relationships between individual experience, organizational knowledge, and the dynamics of information sharing from a systems thinking perspective. The major hypothesis is that the introduction of groupware increases the volume of information available for sharing and opens up new channels for sharing, but that other forces (e.g., individual time constraints, lack of information management), ultimately reduce the transfer of individual knowledge to the organizational knowledge base.

To evaluate this hypothesis I will create a simulation model of the effects of groupware on individual and collective information seeking and sharing behavior. The goal of the model is to provide organizations with a tool that depicts the relative effects of the positive and negative forces on information sharing. When completed, the model will provide new perspectives on the use of groupware to support organizational learning and the policy options available to firms attempting to increase the return on its technology investments.

References

References are available upon request from the author.