A State Telecommunications Architecture for Technology Transfer

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This paper examines start-up operations of a videotex information service to transfer technical data from state and federal research laboratories to business and industry, state agencies, county government, and community groups. The study evaluates the demand for information, service operations, factors affecting adoption of the service including promotional and training efforts, and resource integration across cooperative state and national agencies.

Successful information systems are partly managed through a careful implementation, and partly feed on their own success, as long as the development and implementation team continue to provide users with value-added services. User unwillingness to accept and use available systems may be the result of inadequate training, the “unfriendliness” of the systems, or simply that the supplied information is not the information that is needed.

The example system solved many of these issues by carefully evaluating information needs and usage trends, centralizing needed resources within a standardized interface, and enacting extensive training and promotional agendas. Users showed a willingness to adopt videotex information services, and wide-area networking, as a primary means for transferring research data from university, state, and federal laboratories to the private sector.

Long-term adoption required that the service contain information of high value, either not readily available from other sources or in a substantially enhanced format, and that the service be integrated into existing work processes. Formative evaluations revealed a disparity between perceived information needs and actual information usage.

Implementation Research

Organizations have adopted information technology to coordinate information flow within organizations to improve internal productivity, and for external communications to coordinate production operations (Macdonald, 1992). An increasing proportion of information processing is being managed by line-level workers and end-user computing is achieving an enhanced status and an increasing proportion of the IS budget
(Bergeron, Rivard, & Raymond, 1993).

Research pertinent to the implementation of peer-managed, wide-area information services addresses human-network factors, the evolution into participative technologies, and organizational change through adaptive systems. While “participative” and “adaptive” classifications can be encompassed within a broader “learning” model of organizational behavior (Lyytinen, 1987), recent technology shifts into distributed and network-based systems provide a basis for a closer evaluation of the individual and collective impact of network or telecommunications-based information processing.

**Human-Network Factors**

The integration of office information technology, online information systems, and infrastructure communication services is still relatively new. Analysts estimate that today’s companies can access only two to five percent of their information resources online (Eisenman, 1992). A common failing in the implementation of online information systems is their inability to foster a critical mass of users. This is often because inconsistent user-interface designs and irregular patterns of human-computer discourse have hindered adoption (Ridgeway, 1989; Straub & Wetherbe, 1989). Successful implementation often requires that individuals learn new ways of performing tasks, and in some cases, new ways of thinking about communications (Mulgan, 1991; Cash, McFarlan, & McKenny, 1992). “Networking” becomes as much a sociology as it is a technology (Edelhart, 1987; Thachenkary, 1987).

Standardized interfaces and operating procedures for information services across multiple platforms, networks, and operating systems can alleviate many of the human-network interface problems (Molich & Nielsen, 1990). Developers strive for a “transparent” network with interface, search, and retrieval mechanisms which manipulate, process, and present data in formats appropriate to the needs of the user (Rockart & Short, 1989). When correctly implemented, society can capitalize on the inherent capacity of networks to provide interdependency, enhance cooperation and coordination, and promote competition (Antonelli, 1992). Line-level knowledge workers involved in the use, production, and processing of information, at either a strategic or operational level, will themselves manage network resources and thereby alleviate national concerns about the updating and maintenance of information (Karivalo, 1989; National Academy of Sciences, 1989).

**Participative Systems**

Computer applications have evolved from task automation, to business process automation, and are now a strategic resource of the organization (Martin, 1988; Tobias, 1991). Information resource management has become a major responsibility throughout the organization, at all levels, and in all functions (O’Brien & Morgan, 1991). This has occurred as organizations evolve from the traditional “top down” American management style toward the “bottom up” Japanese style (McClatchy & Caldwell, 1991).

Successful implementation of information technology has involved evolutionary processes as organizations “learn” by deriving the structure of IS development processes from the various independent IS activities (Lucas, 1978; Lyytinen, 1987; Madabhushi, Jones, & Price, 1993). Value-added dimensions of the information include elements of data design, storage, and retrieval, and attributes of information marketing, distribution, and presentation (Mowshowitz, 1992). Gaines (1986) uses the term “participant systems” to refer to the implementation of independently managed IS processes in distributed systems.

As the infrastructure links workers, organizations, and their customers, empowered workers will use the networks to generate economies of scale in production and knowledge generation across the entire organization (Brown, 1992). As network technologies enable peer-to-peer associations among participants, IS strategists will focus on the required skills of employees, the development of individuals as information managers, and the embedding of information services in organizational processes (Madron, 1991; Broadbent, Lloyd, Hansell, & Dampney, 1992).

With the integration of information services into organizational communication networks and office information processing systems, participants will learn those skills necessary to administer online resources and improve work efficiency (Jarvenpaa, 1989; Maule, 1991, 1992). The empowerment of the end-user will be a key ingredient in the success of distributed systems as users interact with fluid, dynamic resources and thereby drive organizational innovation (Scully, 1989, Hopper, 1991).

Martin (1988) believes the highest return on investment is realized when business processes are restructured to take advantage of interlocking networks to
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