



Early Catalysts of Centralized Information Resource Management

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ABSTRACT

This review suggests early catalysts of state-level centralized information resource management organizations which coordinate agency data processing activities in the management of information systems. What factors influenced the creation of early centralized and later coordinated data processing functions? Whether or not to centralize the processing of data has been a long standing debate (Perlman, 1965; Oldehoeft and Halstead, 1972; Statland, 1978; King, 1983; George and King, 1991). Yet, in terms of public management, no single event has placed information resource management (IRM) at the center of concern and attention (Caudle et al., 1989). This historical perspective explores some catalysts of IRM as they evolved from intra-organizational issues that later became inter-organizational practices.

The assumptions about centralization are in transition. In the mid-1980s, a shift in IRM evolved from outright control toward more of a coordinating role (National Association for State Information Systems, 1987). By the time of a 1989 study, researchers reported that state IRM could not, and should not, be defined by a single model or approach (Caudle et al., 1989). More recently, California's legislation empowering certain centralized data processing functions effectively sunset on July 1, 2002 (Government Technology, 2002).

What are centralized and coordinated IRM entities? The dominant organizational units were found to involve data processing operations, telecommunications, and policy and planning (Caudle, 1990). The first and most likely place to find an IRM unit is under the state comptroller, finance, budget or treasury departments, with the second most likely place being under the chief executive's office (Caudle et al., 1989). All but six of the American states have either a Chief Information Officer or an IRM Commission (National Association of State Information Resource Executives, 1996). Other contemporary researchers have explored those implications (Lee and Perry, 2002). But when could centralized information resource management have first occurred?

Understanding the obstacles overcome by automation innovators will provide valuable insight in considering the catalysts of centralization. The scenario that follows shows a slow and steadily increasing technical progression of data processing as organizations trended toward centralized control. An understanding of the IRM problems is highly relevant because, at the onset, data processing functions often occurred where is, and as is, in relation to their place of origin (Statland, 1978) and they tend to stay that way (Danziger et al., 1982). Early developments in computer peripheral equipment may have eased, or even facilitated, transitions in organizational structures and the themes of media and "organizational memory" are persistent (Huber, 1990; Simon, 1997; Wang, 1999).

DEVELOPMENTS PRECEDING GOVERNMENT DATA PROCESSING

Some of the enabling technologies from the past served as catalysts for centralization. The ability of a data processing organization to centralize often involved how it dealt with enhancements to recording

media types, while grappling with the procurement of new computer equipment and its rapid obsolescence. In an early ADP almanac, the publication entitled *Data Management* was among the first to summarize and compile significant computing events (Data Processing Management Association, 1971; hereafter DPMA). A consistent theme was the high number of computer vendors and the rapid evolution of equipment and change.

Because documents for bureaus were often stored in warehouses, various filing schemes were necessary, and the maintenance of indices was crucial. Many independent firms sought to develop answers to these problems, using different types of equipment. In 1954, International Business Machines (IBM) developed the first production model of the IBM 701 electronic calculator. The 701 used three devices for memory, including cathode ray tubes, magnetic drums and magnetic tape. IBM, Burroughs Corporation and National Cash Register (NCR) developed their own brands of punch cards. In 1958, Frieden Calculating Machine Co. introduced 5-, 6-, 7- and 8-channel paper tape. Their technologies also eliminated the need to convert to punched cards. In 1959, vendors such as Sperry Rand, Burroughs, Frieden, and General Electric also made advances. In 1960, RCA, Honeywell and Collins Radio joined the growing list of vendors (DPMA, 1971). This proliferation of vendors and technologies dictated a need for standards.

After the developments involving punched cards came faster data media technologies using punched tapes, yet the different numbers of paper tape channels caused problems for standardization. Magnetic tape machines were also developing, but the specifications for each were even more varied. After a shake-out of tape vendors, the State of Illinois had nine IBM tape systems composed of three model numbers involving seven core agencies (Kennedy, 1965). This illustrates the complexities of constantly upgrading and/or replacing obsolete equipment.

TRANSPORTABILITY

As previously described, computers and data storage media were constantly being improved. The significance of magnetic tape cannot be overstated. For once, all the records of one agency could be placed on reels of magnetic tape and transported from one place to another. This meant that if the other organization had a compatible tape reader, that agency could serve as a backup for data processing services. Since problems frequently occurred with these new technologies, difficulties were anticipated. Clearly, with the procurement of standardized equipment, one or more agencies *could* act as backup to others and those agencies that specialized in those services evolved toward central data processing divisions.

This discussion leads to the brink of *when* centralized data processing could occur. A technological break—facilitating more complicated organizational structures—was made possible via the use of magnetic tapes. An idea to timeshare computer resources evolved from more than two years' development of hardware and software centered at

Digital Equipment Corporation (Harris, 1964). After that, the capability for timesharing between users and remote computers became possible.

During the timesharing era, the processing of batches of data using reels of magnetic tape was increasing. From agency to agency, if there were problems with a tape device, other agencies could attempt to share their resources and get the tape processing done. These attempts at combining data processing resources were called "pooled" services and some agencies began to specialize in that function. Beginning in the 1960s, states struggled to adopt new technologies to ensure the continuity of file intensive functions, regardless of whether the data was centralized or decentralized.

Based on the previous descriptions, the debates about whether to centralize data processing functions began around 1963. This year was implied by John Leslie King who, in the mid-1980s, described how the debate started some 20 years earlier (1983). King, who thoroughly framed this issue, foresaw the debate as largely unsolvable (1983) and over (George and King, 1991). The debate proved persistent, continuing up to include contemporary technology issues (Burton and Obel, 1998; Fulk and DeSanctis, 1999). Some organizational theorists claimed that centralization may be caused by a crisis (Mintzberg, 1979; Tushman and Romanelli, 1985) and Y2K may have been a late catalyst.

SUMMARY: CENTRALIZATION AND DECENTRALIZATION

The need for the development of an effective information technology infrastructure is ever increasing (Kayworth, Chatterjee and Sambamurthy, 2001) and may be better accomplished with a centralized perspective. In a quest to create knowledge-based organizations, Paul Straussman suggested a federated approach (1995) and Ida Hoos described a large-scale project in California as having those traits (1966). Others have described federated organizations (Keen, 1990) and have indicated how there may be more in the future (Heckscher, 1994). Because of new information and communication technologies, a simultaneous centralization/decentralization can exist (Heydebrand, 1989; Fulk and DeSanctis, 1999). These are examples of how organizational expectations have changed since improvements in computing media and lower costs could facilitate those changes. Still, an attempt to explain what actually happened could be of benefit (George and King, 1991), and that is the basis of this review.

It appears that the magnetic tape enabled agencies to bridge their organizational boundaries, now a commonplace practice. This historical lens is often clouded by the latest capabilities of media and networking. These include on-line databases, networks, servers and wireless communication devices, to name just a few. By tracing early developments in computing media, along with the need for transportability, the organizational issues related to centralization become clearer. Based on those developments, both the debate and technology appear to have occurred early and simultaneously, yet the effective administration of information resources remains an ongoing and vibrant issue.

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