

8-25-1995

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Recommended Citation

Glassberg, Bonnie C. and Teng, James C., "An Enterprise Framework for Client/Server Technology Assessment and Implementation" (1995). *AMCIS 1995 Proceedings*. 27.

<http://aisel.aisnet.org/amcis1995/27>

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An Enterprise Framework for Client/Server Technology Assessment and Implementation

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ABSTRACT

While numerous articles have recognized the importance of organizational planning and technology planning, and the need to link the two processes, they have consistently treated each new technology as a culturally- and structurally-independent productivity-enhancing innovation. Client/Server technology, however, has the ability to enable radical process change, impacting both the way business is performed and the power structure within the organization. Firms therefore need to take a more holistic approach to planning and implementation when considering the use of Client/Server and other change-enabling technologies.

INTRODUCTION

The newest item to hit the information technology auction block is Client/Server (C/S) Architecture. C/S represents a critical juncture in computing technology. It ties together all the existing 'islands' of technology into a seamless bundle, providing interoperability between mixed computing platforms [Smith and BCG, 1992; Walsh, 1993] and allowing distributed processing to occur over a network where two or more computers share the workload [Golick, 1990]. Technical innovations, such as C/S, offer a rare opportunity to initiate change [Orlikowski, 1991; Saelens and Nelson, 1994] which is enhanced when C/S is combined with other change processes, such as downsizing and re-engineering [Davenport, 1993; Hall, Rosenthal and Wade, 1993; Van Kirk, 1994]. Functional managers, tired of the dependence on IS for application development, routine maintenance and adhoc work requests, are looking at C/S for ways to solve their own data needs and do it faster [McClellan, 1979; Pepper, 1993]. It is not surprising therefore that interest in C/S is growing.

Swayed by trade journal claims of massive cost savings (from mainframe displacement) and productivity improvements, firms are implementing C/S technology without properly establishing a business need for it [Ferguson, 1994] or evaluating its human resource implications [Doll and Doll, 1992; LaPlante, 1993; Dostert, 1993; Conner, 1993]. Estimates are that approximately 70% of the cost of implementing and maintaining C/S environments during the first five years will be for human resources [Gartner, 1993]. People will have to be trained in the new technology (which places more responsibility for maintenance and backup in the field), personnel may be reallocated (as workloads migrate away from the glass house and into the functional units), and some jobs (such as

mainframe technicians) may disappear. In addition, the infusion of C/S technology into the organization can be rocky. Power and politics has been cited as a major issue in implementation [Orlikowski, 1988]. New technologies, therefore, must be evaluated not only for their potential to provide business solutions, but also for their impact on the organization as a whole. Fear of change, loss of control and a disruption of the status quo are some of the social and psychological effects of innovation [Branda, 1994; Eastwood, 1993; Nelson, 1990]. Top management would therefore be wise to take a holistic approach to the introduction of C/S architecture.

The needs of the business, its structure and culture should be primary considerations when deciding whether or not to bring in any new technology. Studies have shown that hierarchical organizations with formal reporting relationships tend to have centralized administrative structures and computing environments [Tavakolian, 1989]. C/S environments, by their nature, enhance autonomy and decentralized decision-making. They empower functional units with access to and control over their own data. Distributed databases, new productivity software and networks change the fundamental way work is done and where it is done. Management must ensure that either a match exists between the strategy and structure of the organization and the C/S environment that will be created, or be prepared to manage the transition to it.

The **purpose of this paper** is to guide top executives and MIS managers in the assessment and implementation of Client/Server technology by focusing on the planning process. A conceptual framework is introduced which suggests an enterprise-wide approach to planning, assessment and implementation of change-enabling technologies, such as C/S. The framework consists of six basic processes: **Organizational and technology planning, organizational and technical implementation, and organizational and technical assessments**. These processes are linked together by shared goals and cross-functional organizational roles which provide the feedback necessary for adjustment, measurement and reconciliation. Although each process has its own agenda and schedule, the activities are on-going. When one decision, assessment or plan has been passed on to the next level, a new cycle begins. For convenience, the discussion will begin with organizational planning which derives its thrust directly from corporate strategy.

ORGANIZATIONAL PLANNING

Some firms display an inordinate amount of inertia in their planning processes, continuing programs and initiatives that have long outlived their usefulness. While companies that do plan appear to outperform those that don't, the quality of those plans varies considerably [Lorange and Vancil, 1976]. For some firms, planning is simply a yearly administrative task that resolves budgetary issues. In other organizations, planning is a comprehensive and continuous process that occurs at many levels. Comprehensiveness of planning has been linked with positive performance in stable environments [Frederickson, 1984], but also with negative performance in unstable ones [Frederickson and Mitchell, 1984]. In general, it is not the pervasiveness of the plans that

count, but the quality of them. The planning process itself can be a powerful mechanism for initiating change and altering the balance of power in the organization.

Organizational Planning involves defining strategies for the use of technology in the enterprise. It includes both strategic and business elements. It is the means to provide scope, prioritize initiatives and allocate resources. Technological resources legitimize activity through ownership and control [Giddens, 1984; Orlikowski and Robey, 1991]. Although the outcome of organizational planning processes are strategies, business practices, products and specific applications may be targeted. Regarding technology decisions, the planning process at this level should address these fundamental points:

- Is C/S really needed or will other improvements reach the same objectives?
- How will this technology improve the business?
- What benefits and problems are associated with it?
- Is there a specific application where it is needed?
- How will it impact the firm's human and material resources?

Often, the impetus to adopt C/S is lowering cost. Managers see it as a way to get rid of their mainframe. However, mainframes provide control, security and large volume data crunching often cumbersome in distributed environments. Firms must determine if C/S technology provides the requisite level of security, is mature enough to support mission-critical applications, and is powerful enough to handle the transaction processing workload. Firms will also experience a cost shift -- money saved by eliminating mainframe hardware (or putting off a new mainframe purchase) will be spent on human resources. Not only do companies lack experienced C/S personnel, few employees outside of IS are prepared for the rigors of maintaining mission-critical systems. In sum, the planning committee must determine if the technology is right for the organization and if the cost savings are truly justified.

STRATEGIC ALIGNMENT

Research shows that there should be tight fit between corporate strategy and the organizational structure that supports it [Chandler, 1962; Miles and Snow, et al., 1978]. Likewise, **Alignment** between corporate strategy and IS strategy is critical to achieving effective utilization of resources, improving productivity and finding opportunities to use information technology for competitive advantage [King, 1978]. Input from IS management in the organizational planning process is key to integrating and aligning technology goals and objectives with corporate goals and objectives. Synergy, between organizational and technology goals, can be achieved if these two sets of objectives are consistent and compatible [Das, Zahra and Warkentin, 1991]. It is the responsibility of technology planners to assure they are aligned.

TECHNOLOGY PLANNING

Technology Planning is very critical. As most medium and large-sized companies are dependent on computer technology, there is a need to design a technology strategy that

will provide flexibility, utility and reliability [Fischer, 1992], while outlining sourcing policies and global communication strategies to meet business needs [Zahra, Sisodia and Das, 1994]. Managing the technology portfolio is also a primary goal of this process. New generations of technology are created every twelve to 18 months, not five to ten years into the future [Bird, 1992; McClimas, 1994]. Immature technologies, such as Client/Server, may offer first-mover advantages, but at the risk of drowning in complexity or obsolescence (when the next generation comes out).

IMPLEMENTATION

The implementation of new technology, and the applications which use it, proceeds in two phases: organizational and technical. **Organizational Implemen-tation** refers to changes in administrative policies and reporting relationships that must be put in place prior to the installation of the technology. For example, modifications to the compensation and rewards system may be essential to support newly empowered personnel. Technology itself cannot be observed in isolation -- it should be viewed as a "pattern of social relationships" [Blackler and Brown, 1986] and "part of the total psychological working environment" [Agervold, 1978]. Potential problem areas should be identified prior to technical implementation and handled before their appearance. When downsizing and re-engineering initiatives coincide with the implementation of C/S, major shifts in personnel and job responsibilities (including empowerment) may be needed. Planners must take this opportunity to cope with the social and political issues that surface during transitions [Nelson, 1990], such as informing employees of changes that will affect them. Once the organizational implementation has begun, technology implementation can then proceed. **Technology Implementation** deals with specifics of the architecture, application development and user training.

FEEDBACK

In addition to traditional planning and implementation stages, firms need to evaluate the effectiveness of new technology and provide both **Organizational and Technical Feedback** to the planning processes. These feedback loops are essential to keep planners aware of new initiatives, problems and opportunities. Although too numerous to identify here, many authors suggest that measures of technology *efficiency* can be obtained on items such as: throughput, response time, usage, costs (time and money), compliance to design specifications and standards, backlogs and audits. Measures of technology *effectiveness* can be collected regarding: user satisfaction, system performance, ROI and cost/benefit analysis. Surveys of user satisfaction can be used to gather attitudes and opinions on: resource allocation, security, level of participation in development activities, relationships with IS, adequacy of training, system reliability, ease of use and quality of computing resources. Many of these measures can be taken both before implementation and after.

SUMMARY

Any technology, especially C/S, in and of itself cannot deliver the sweeping changes so necessary to compete or to survive in today's world. The search for quality, excellence and service must begin at the very top of the organization and can be carried down through an integrated planning process [King, 1985; Grover, 1991]. **Corporate vision** should guide decision-making based on a thorough investigation of business needs, and critical elements, activities, processes and success factors [IBM, 1984; Porter and Millar, 1985; Rockart, 1979]. Technology decisions need to flow through several layers of planning so that legitimate business needs are met, the benefits identified, the impact on the organization evaluated, the problems anticipated and opportunities discovered. When considering the adoption and implementation of C/S technology, it is the human resource issues which will require the most attention and this will take an integrated planning effort.

References available upon request.

