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8-25-1995

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Recommended Citation

Desai, Mayur S., "Organizational Context and Client-Server Architecture: A Proposed Research Strategy" (1995). *AMCIS 1995 Proceedings*. 133.
<http://aisel.aisnet.org/amcis1995/133>

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Organizational Context and Client-Server Architecture: A Proposed Research Strategy

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INTRODUCTION

The unification of information systems (IS) resources regardless of the degree of heterogeneity and the location is a critical issue for IS management. Client-server systems (CSS) is making significant contribution to this enterprise computing. The problem facing many managers is that at present there is no one approach to determine how to leverage the CSS power to information technology (IT).

The purpose of the proposed research is to investigate the relationship between two topical domains, organizational context and client-server systems architecture (CSSA). The specific objective of this research is to identify the problems organizations face in CSS environment and study the relationship between the CSS elements and organizational elements.

PROBLEM DEFINITION

The problem motivating this research is that at present there is no one approach to determine how to leverage the distributed computing power of the information technology (IT). CSS is one of the categories of distributed computing.

Integration Issues

One of the major problems that organizations face today are integrating the CSS into their existing infrastructure. MIS managers' concerns are deciding between developing an in-house application versus defining a CSS to replace that application or perhaps modify an existing software. The applications include marketing, accounting, ad-hoc data bases, graphics, and so on. These applications involves large sum of investments including some hidden costs which are never accounted for (Kirk 1992). It is difficult to show a clear return on investment for CSS so it is easy to deselect that as an option, said an IS manager at major telecommunication systems. He views CSS benefits more as convenience than as a business necessity (Davis 1991).

Resistance to change

There are technical problems that show up whenever an organization implements a new system architecture. Any major change in the system brings an organizational problem. There are two types of problems. For example, CSS can give end user new authority over system and make many traditional information systems (IS) functions obsolete. IS

professionals perceive that their job is at risk. This perceived fear of IS professionals turns into a negative behavior which results in their rejection of a CSS solution.

Training issues

Training of end users is a critical issue under CSS environment. Since the users now have more control over developing an application, users increasingly need to upsize, or scale up, applications developed on PC databases. Like downsizing, upsizing is an approach to moving an application to a client/server platform (Brandel 1994). Vendors do offer products to make upsizing easier for users. For example, Microsoft Corp. has introduced the Access Upsizing Tools, which allow users to upsize from Microsoft's Access PC database to Microsoft's SQL Server. (Brandel 1994).

SIGNIFICANCE

The significance of this research can be explained in the light of the significance of each of these problems. It will provide a basic framework to work with so that each problem can be mapped into this framework and be dealt with in organizational context. Addressing the question of selecting hardware and software platforms is important because of the heterogeneous environment of organizational computing systems.

Decision regarding what applications, or what part of the application should adopt new technology or what segment of the application should be on CSS or traditional technology is important. This is to keep the organizational and IS goals in alignment by proper allocation of resources.

Addressing the issue of integrating new system into existing infrastructure is significant because IS architecture is the map of the overall organization. Also the IS architecture is generally built upon the business architecture of the firm. Niederman (1990) identified this as the number one issue of the IS.

Training of the IS professionals and end users is critical. The role of IS professional is an agent of change and an agent of stability. However, with the new CSS environment the organization management is now the agent of change. Organization such as Georgia Gulf hired a change management consultant to train and provide team building exercise for IS professionals (Kirk 1993).

The 6th annual survey of chief information officers (CIO) conducted by Deloitte & Touche LLP was entitled "Leading Trends in Information Services 1994." (Bodnar 1995). The survey results indicated that respondents classified nearly 70% of their applications as legacy systems. 72% of the respondents report using some form of client-server architecture now, and 88% say they plan to use some form of it by 1995.

SIGNIFICANT PRIOR RESEARCH

Although there is an extensive literature that includes the study of CSS architecture in organizational settings, majority of studies are found in practitioner journals. The focus of these studies has been on various CSS architectures, hardware and software platforms, and opinions of the corporations using CSSs.

Rofrano (1992) reviewed a number of issues involved in understanding the distributed processing environment and using it as a leverage in developing applications. Rofrano (1992) developed an object/action matrix with function placement that an organization can use to distribute its functions on various platforms. The matrix takes into account the views of end users, IS professional, and executive. Sinha (1992), in a current technology review, provided a comprehensive study of the evolution of CSS paradigm.

The Benjamin and Blunt (1992) study presents critical IT issues for next ten years. The study indicates that in order to create a best case scenario for computing environment in the future years, the improvement of the cost performance and the standardization of CSS architecture will be important.

A two part report in I/S Analyzer (1992) provides a case study which investigated the installation of CSS in a company in Canada. The findings of the report indicate that proper placing of CSS in organizational setting makes people more productive. The two most critical elements for successful CSS installation are client satisfaction and improved access to information. Another I/S Analyzer (1992) finding indicated that a careful planning and design of architecture, establishing policies for data management and security, and creative effective documentation are important factors for implementing CSS.

RESEARCH FRAMEWORK DESCRIPTION

At present, there is no framework that shows the relationship between the CSSA and organizational elements. Most of the architectural framework presented here were found in several practitioner journals; however, they were all intended for showing the functional characteristics of CSS. They all lack a research perspective that one could use to develop a theoretical foundation.

Research Framework/Model

The framework for managing EUC by Alavi et al. (1987), elements of the Ives Hamilton and Davis and the Nolan and Wetherbe's frameworks were used as guidelines in developing the CSS framework.

CSS Framework

Figure 1 represents the organizational management relationships in the CSS environment. Figure 2 shows the levels of activities as shared by IS, end users, and management personnel in the CSS environment. Thus, Figures 1 and 2 represent an overall research framework for CSSA in an organizational setting.

Figures not available. Please contact author.

The IS/EUC/Management relations show the interaction between IS management, EUC management, organizational management, technical training, and change management in CSS environment. Training is divided into two functions -- training for IS professional to cope with change introduced by the CSS environment and technical training for IS personnel and end users to deal with new hardware, application software, and network software. IS management, EUC management, and organizational management interact to support application development that generates the desired output. Figures 2 show proportion of activities by EUC, IS, and organizational management personnel.

In the CSSA, end users interact directly with the client who may also be responsible for majority of the equipment at the client user interface. The IS professional is in the support role. As we move to the network element of CSS, the client activities reduce because the end user is not involved in managing the network except in an unusual circumstances. The IS professional's activities increase near the network portion of the CSSA. As we move to the server portion of CSSA, the IS professional's responsibility is almost absolute because it is the IS professional's responsibility to maintain the gateway to mainframe, data integrity, and data security as well as performance and monitoring of the system. Management activity also follows the same pattern as the IS professional.

EUC activities include control, budget, configuration selection, graphical users interface (GUI) selection, workstations (WS), and data processing. IS activities include technical management and support of end users including network and server related problems. IS activities are maximum at the server portion of the CSSA because server supports variety of clients.

Additionally three major activities supported by IS professional are: application management, network management, and data management as shown in Figure 2.

The management of application development and EUC support is critical in the CSS environment. End users may find it relatively easy to develop application however, they may not be aware of the guidelines and the rules for documenting their application development thus require support from IS professional.

Network management requires a special attention in the CSS environment. Developing and distributing computing power and network in cost-effective manner is a major task in the CSS environment

Data management refers to the activities involving managing the data used by end users working on the client platforms. Data management activity also includes managing overall organizational data.

CSS management activities includes planning, policy, approvals, and budget. These activities are administrative. Management activities are more closely tied to the server

components of CSS than client components in CSS environment because servers are assumed to be larger size computer systems compared to the clients'.

The organizational environment includes other elements such as processes, operations, and IS of organization (Ives et al. 1980). The external environment includes elements such as vendors and customers.

CONCLUSIONS

A theoretical framework of CSS in organizational context was presented. A set of independent and dependent variables were identified for future studies. The CSSA is relatively a new area of research in field setting. Since it is important to identify key variables before we can measure them, Buckley et al. (1976) suggest an inductive approach to conduct the research for generating a hypothesis. A case study is normally used for generating hypothesis. The first logical step would be to use an empirical/case study as a research strategy. The unit of analysis can be a large corporation using CSSA in its organizational setting. Such a case study would be useful in identifying the set of variables needed for future research. The variables presented in Table 1 could be used to map the variables identified by the case studies. These variables can be used in a field setting to verify their causal relationships. In a field setting it may be possible to collect data from several functions using CSSA. It is also possible to set up a quasi-experiment by measuring one application running on a main frame and the other on CSSA. The outputs from both the applications could be measured and compared. This is not the ultimate CSS architecture; however, it provides a perspective to clarify the ambiguous terms indicated by this study.

Table 1: Variables, Surrogates, and Measures

Variable Name	Type of Variable	Surrogate Name
Client	IV	Hardware Software
Network	IV	Hardware Software
Server	IV	Hardware Software
IS Professional	IV	Skills Experience Training
EUC/end user	IV	Skills Experience Training

		Level of Authority
Organizational Management	IV	Budget Skills/Style CSS Control CSS Planning
Productivity (Quantitative component of Performance)	DV	Productivity
End-user Satisfaction (Qualitative component of Performance)	DV	Ease of Use Timeliness Accuracy