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Abstract

The information explosion and increasing business demands have put heavy pressures on information systems (IS) management almost to the point of creating an identity crisis. For competitive advantage, successful businesses have been able to integrate the changing IS environment into the business environment. To accomplish this required a bonding of business and IS goals which literally turned out to be an organizational revolution resulting in a philosophical change for managers at all levels in the organization. For IS the challenges could be likened to the days of yore search for the Holy Grail or the "fountain of youth." Successful managers in search of excellence can no longer expect to find magical solutions to technical problems; in fact, the problems may be more management and people oriented requiring solution by both non-technical and technical resources working in concert.

The challenge is sharpened by statements such as one made by Peter Drucker in 1991 that, "within the next 10 years, both the structure of organizations and the jobs of the senior people within organizations will be drastically changed, primarily because of information. " There is little doubt that change, and with it flexibility, is the key to success in IS management. The rapid proliferation of emerging information technologies drives home the point that IS cannot run in place without losing ground. Even the traditional classes of architecture for data processing, word processing, data management, spread sheets, and data communications are changing at a greater pace than current IS organizations can absorb.

To meet today's and tomorrow's challenge requires that IS executives and managers must look at the entire enterprise--not just the technical. This involves the business environment and processes and then deftly fitting in a reengineered IS and information technology (IT) to meet increasing demands in an environment of greatly reduced budgets. Taking this broader view does not lessen the impact of automation and high technology but shifts some of the emphasis in other directions. The focus can remain on the computer but, in the final analysis, values to the organization are in the business processes. Only with the shift to a business philosophy can bridging the gap between research and practice become a reality in the 21st Century. The rapid proliferation of emerging information technologies drives home the point that IS cannot run in place without losing ground. Even the traditional classes of architecture for data processing, word processing, data management, spreadsheets, and data communications are changing at a greater pace than current IS organizations can absorb. To further analyze this in the presentation, ten major emerging technologies that must be recognized by IS will be identified as critical and trendy developments.

This presentation will concentrate on how these IS challenges can be met, how resistance to change can be overcome, why IS design is more of an art than a science, why must the IS/MIS be user oriented, what should a successful information technology platform look like, what are the critical emerging technologies, and what are the major issues facing IS. Business climate and integrating methodologies will be at the forefront.

Background

Over the relatively short history of computer-based information systems, professionals have gone through a series of generations which were initially based on heavy technical development of hardware, soon followed by software, and later by peopleware. Early developments were focused on programming and data processing. Later, preoccupation with getting the computer to work gave way to concerns about what functions computer systems should do and numerous applications in which high technology would serve business as well as research and development operations.

Information systems soon became a feature of automated systems where word processing, decision-support and decentralized processing developed into major courses of action in carrying out business functions. The digital computer opened the door to replacing electrical accounting machines (EAM) and in a generation or two this lead to office automation, microcomputers, and multiple niche applications as we know computing today. Greater demand for applications led to the need for integrated systems such as computer-based information systems based on the idea of serving management at all levels.

As some authors have found, it is useful to consider IS as a business within a business even though integrating IS into the other functional areas of the firm may cause special organizational and strategy-formulating challenges. (McFarlan and McKenney, 1983) However, this integrated approach must be taken in order to address the organizational issues surrounding IS. This paper focuses on this approach which is drastically changing the nature of the IS field. Notable among these trends are the use of IS technology as a part of corporate strategy, end user computing, and the use of PCs as managerial workstations. (Lucas, 1990)

Environmental Demands

The challenge to IS managers has increased in geometric proportions since 1990 as trade-offs with new technologies have now become the order of the day. The good part of this is that investing in state-of-the art equipment updates the IS resources to meet shifting resources; the bad part is that some of this new equipment will be obsolete six months from now. By definition, whenever there are trade-offs something is lost but if the gains outweigh the losses the trade-off may be worth it. (*IS Forum*, 1995) The cost/benefit relationship is difficult for IS managers to cope with in the current environment.

However, rather than "fighting" technology advances, IS managers should view these advances as providing them new ways of providing service to users, customers, or other

beneficiaries of IS. This could even result in new strategic business benefits and a redefinition of IS or customer service. IS managers should always empower their customers by providing higher-quality/value service at reduced costs and improved response time to user inquiries and problems.

IS managers to survive must provide the information that executives really need for business survival. Drucker points out that it is the concepts, not the tools that are important. It is those concepts that are needed to understand how to use information in businesses that convert into techniques and into integrated IS. (Drucker, 1995)

An overview listing of current/critical issues in the managing of IT/IS brings to the forefront a myriad of challenges of situations where IS may have to restructure itself to adequately serve management development and business processes. This list spans a broad scope of issues from conventional organizational theories and models to the more drastic moves toward outsourcing of IS/IT components. These are not leadership-less issues. For example from the MIT Sloan School of Management, for starters, is the work of: John Rockart on Critical Success Factors, Stewart Madnick on Connectivity among IS, Tom Malone on Organizations of the 21st Century, Michael S. Scott Morton on the changing business environment, and Chris Kemerer and Robert Fichman on Object Technology. (Center for Information Systems Research, MIT, Sloan School of Management, 1995)

Proliferation of Information

Technologies (IT)

Without fully realizing the rapid pace of change, professionals are faced not only with developing the connectivity between mainframe and PC systems but are now having to deal with another area of data communications sometimes referred to as Networking. In an article in the Harvard Business Review on "How Networks Reshape Organizations-- For Results," the point is made that "a network identifies the 'small company inside the large company' and empowers it to lead." (Charan, Sep/Oct 1991) No longer is communications a separate field from data processing; it now is a part of distributed processing. Networks began to matter when they changed the behavior of the attitudes and dialogues among managers. Data processing personnel and MIS managers found that Local Area Networks (LANS), Wide Area Networks (WANS), Satellites, special hardware and software, and protocols are now needed for integration with the MIS. This calls for close coordination and a requirement for new architectures. This is basically where we are today. More on architecture will be covered later in this paper.

Systems Integration Through Architecture

If anything, data processing and the Computer Industry have been plagued with too many sudden changes (Vaporware) and resultant abandoned/ obsolete systems and architectures. Not only did the advent of the PCs result in near anarchy (Hoffman, 1991), but the other changes going on have brought on requirements hitherto not planned for.

This forced professionals into a cycle of architectural changes which left many carcasses scattered around the environment. More than one professional manager has asked the question, "Where do we go from here?"

As has been pointed out (Hoffman, 1991), we learned during the MIS cycle that we cannot build a stable overall (IS) for other than perhaps small "Mom and Pop" enterprises. Even subsystems such as the DBMS cycle have proven to be difficult to implement even though the concept did make it possible to manage data better through a centralized collection and storage methodology.

Rapid changes in technology and in user requirements have challenged designers who are now beginning to recognize that design must be flexible and cannot be frozen in place without the risk of obsolesence.

Technological assimilation into the organization is difficult. One reason is that IS technology has had a short life. It cannot be as well established in an organization as the financial functions are because it has not been around as long. Another reason may be that the field has undergone dramatic evolution in its technologies. What used to take years to go from research to use now can take only minutes. With every new system installation, there are new and better systems being designed. Other complexities in IS development sometimes force the creation of specialized departments and further strain relationships. (McFarlan and McKenny, 1983)

Organizations are not structured to change as quickly as technology does. This can have strategic implications for the organizaiton of the future as it attempts to assimilaate technology into its core. Conversely, organizations that do not change structurally may not be able to take full advantange of technology.

Where Do We Go From Here?

In view of the impact on management, user functions, and the high technology function, a broad, encompassing, and flexible architecture is needed for information systems success. We now need a new architecture to bring together and manage as a coherent whole the integration of the following ten major emerging technologies which are changing our corporate workplace:

1. Windows and Client Server Application Development
2. Requirements of Stakeholders and End-User Computing
3. Business and Organization Systems
4. Distributed Processing including End-User Computing
5. Electronic Data Interchange (EDI) and the Data Highway
6. Use of Automated Tools (CASE)
7. Expert Systems, Neural Systems, and Virtual Reality
8. DBMS to include OOP-type systems
9. Distributed Processing including Data Communications and Networking
10. Other types of collaborative connectivity yet to be developed

It is now a mammoth task for managers and professionals of information systems to have an overall design goal where the pieces (elements or modules) of the puzzle can be inserted rapidly to meet shifting demands Some progress has been made to develop the open systems approach, international standards, and more versatile operating systems. An evolving draft of the type of IT/IS platform needed to do this and bring us into the next century is included in the paper.

Summarization of Remainder of Presentation

The presentation includes further discussion of methodologies, organizational issues, problems, and concludes with the future role of IS organizations.

References will be provided upon request.