The Nature of Managing IT and Its Managerial Challenges

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ABSTRACT

Management of information technology (IT) is increasingly important for organizations and users at the work environment. This paper, first, introduces the way IT is changing the work environment. Second, failure to integrate IT, building systems and the work environment is addressed as a result of the subdivision of responsibility by professional discipline and poor communications in team decision-making. Third, this paper describes the nature of managing IT, which is a life-cycle activity and a problem-solving business. Furthermore, managing IT requires multi-disciplinary participation in the delivery process. Finally, four managerial challenges are provided for all professions in the field, including to assess what the users need, plan for better systems integration, manage the project delivery process effectively, and use computer aids for education and training.

Key Words

information technology; project delivery process; decision-making; management; computer aids

INTRODUCTION

Information technology (IT) encompasses a wide range of technologies in information processing for the purpose of tracking, monitoring, recording, directing, and supporting complex human activities. These technologies include equipment such as desktop computers, applications such as electronic spreadsheet programs, to communication media such as twisted pair cables (Davis et al, 1985). Each technology involves different people to produce, install, use, monitor and manage it. A series of revolutions in IT clearly affect how people use, store, restore, modify, and transmit information. Offices are certainly the most visible place for using IT.

As the Office of Technology Assessment forecasted, the dominant trends in office automation from year 1985 to 2000 are likely to be: more powerful machines, software, and networking (OTA, 1985). The growth of information and proliferation of communication options have significantly affected the organizational operation as well as planning, design, and construction.

Management of IT requires not only the presence of people to manage the process of adopting technology, but also the space, structure, and

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necessary infrastructure to support information processing (Becker, 1990). Moreover, implementation of IT requires strategic planning, feasibility study, and design for IT prior to installation. In this paper, management of IT, in a broader sense, includes activities to plan, design, construct, and operate during the life cycle of the overall IT system.

The Organizations, Building and Information Technology (ORBIT) studies indicate that different organizations will encounter different needs in accommodating IT (Davis et al, 1985). IT should be organized as a technology infrastructure to support communication needs of individual workers, as well as to provide the tools necessary to effectively manage the overall system. New technology and innovative approaches to office design can certainly facilitate the information processing through communication. In order to managing IT, people have to understand not only IT, but also its relation with the organization and people, and the building and the work environment. Unfortunately, few people can manage IT in an intelligent way. The following section will address why failure in managing IT has occurred.

FAILURE TO INTEGRATE INFORMATION TECHNOLOGY, BUILDING SYSTEMS AND THE WORK ENVIRONMENT

Much of information technology is used for more than ten years, and its use in the next decade can be predicted. However, IT is still ill-understood, ill-planned, and even ill-managed (Black et al, 1985). Failures in IT procurement and management can be easily identified at the work place. To name some: service cores are too small to accommodate existing and future wiring; wiring layout has less flexibility and is difficult to be modified; vertical chases are inappropriately located and accessed; and information systems fail because of unprotected electrical shutdown and operational mistakes.

In the traditional process in building projects, a client may dictate in conception that the budget should be allocated to facade and furnishing, resulting in restraints on building services. The feasibility study and program may dictate that lower floor to floor height is highly desirable in order to create an extra floor and usable space. The architect may present a preliminary plan that a central core is an important element in plan layout. Mechanical and electrical engineers then plan for distributing ducts and wiring to the entire floor from the central core. In working drawings the specifier may produce a detail that requires all wiring be distributed above the ceiling. Meanwhile, the contractor has been asked to fast-track in order to shorten the construction schedule. When tenants move in, users may want a moderate level of communication and to maintain a moderate churn rate. Then new communication consultants are involved and a new network scheme is planned with compromising of the existing structure and systems. The result? A massive wiring distribution. No one decision is at fault. Finally, the building

manager and IT manager are conscientiously dealing with problems as they arise.

Field studies continue to show that most buildings that perform poorly in system integration do so as a result of the subdivided responsibility and accountability by professional discipline (Hartkopf, 1986). The gaps in the building delivery process and professional design disciplines potentially create coordination and communication problems. Failures can result from decisions made at any step in the building delivery process.

THE NATURE OF MANAGING INFORMATION TECHNOLOGY

After reviewing how failure is occurred, we will try to avoid pitfalls and cope with the nature of managing information technology as it should be. Let us first take a snapshot of designing for IT infrastructure for a typical office environment. In order to produce a memorandum, an end user like a secretary probably does not need to know how the file is transmitted through the communication media and how power is physically connected to the computer and the laser printer. However, user's participation and input on the growth and demands will be useful for defining space program and IT layout.

On the other hand, architects and designers have to know where to locate service cores and decide the right size of vertical chase and clear ceiling height, and whether to choose raised floor or ceiling plenum for horizontal distribution. Electric engineers have to ensure the power capacity is adequate to support users' requirement, then decide the specifications such as three or five watts per square foot. Mechanical engineers have to ensure the air conditioning can maintain the right working range of temperature and humidity for sorts of equipment and occupants. Telecommunication consultants have to decide which network topology or communication media should be used, and how cables will be distributed three-dimensionally and effectively. None of these decisions can be made by a single decisionmaker. On the contrary, most decisions have to be made collectively for working out the best solution.

If all physical configuration is carefully planned and installed, end users still have to rely on the information system personnel to carefully monitor and maintain the network and applications. Quite often, equipment, applications, and even communication media are changed or replaced. If a problem occurred, various people will be involved to identify the problem and solve it.

With the above understanding, we can therefore summarize the nature of managing IT with three important facets:

Managing Information Technology Is A Life-cycle Activity

While many buildings stand for fifty years at least, IT has a life span

typically ranging from five to twenty-five years. Managing IT is not limited to the phase that precedes construction of the project. Buildings and the work environment are continuously occupied by various tenants during different time spans at various conditions for changing activities. Therefore, information technology as well as buildings are operated, re-designed, remodeled, maintained, managed, and ultimately, and replaced.

Managing Information Technology Is A Problem-Solving Business

At the beginning of planning and design, only a few precise descriptions of important objectives, goals, and constraints are usually specified. As with problem-solving, planning, design and management is an intentional application of experience, expertise, tools, methods and process in order to effectively attain the desired objectives. And, as with real world problems such as budget, space and timing, many goals and constraints should be well-defined, carefully estimated, or reassessed throughout the process.

When old problems are solved, new problems may arise. Old solutions may work fine with the old problem or existing systems, but not necessary the new problem or new systems. Indeed, IT specialists are hired to give advice and solve problems. As new IT systems change more rapidly, problem-solving tasks will be more active.

Managing Information Technology Is Multi-disciplinary

Managing IT involves the synthesis of knowledge from many different sources and institutions. The participants in the process vary in training, expertise, and role. Their activity level varies with building type, the stage of the process, the degree of automation, and the nature of the task at hand.

While different organization forms vary, as a team, different players can be organized differently as needed. From a client's perspective, choosing a competitive team is essentially critical to project success. A team may consist of designers, planners, engineers, consultants, and company officials. Organizations may choose the mix of in-house versus outside service. After all, pluralistic decision-making should emphasize goals instead of position. Developing consensus among decisionmakers and seeking user participation will be helpful for shaping the solution.

Furthermore, the participants in IT planning, design and management are often located at different sites, are not often aware of the contributions of others, and often do not participate in team decision-making that makes other participants aware of their decisions and contributions. Distributed decisions may affect their efforts. Today, with the help of IT such as electronic mail, voice mail, and teleconferencing, participants should find it easier to communicate with each other and work more effectively.

Although there has not been much change in the nature of managing IT,

there has been progress in IT development. New problems are continuously growing as new IT products are being produced. New needs are therefore brought up in terms of compatibility, efficiency, productivity, and economics (Brill et al, 1984). These needs can be translated into managerial challenges as described below.

MANAGERIAL CHALLENGES FOR MANAGING INFORMATION TECHNOLOGY

An international study in advanced office buildings was undertaken by the Advance Building Systems Integration Consortium (ABSIC) and Carnegie Mellon University from 1988 to 1991. Major findings indicate that the future workplace must emphasize three specific areas beyond the introduction of new IT products:
(a) the critical performance qualities needed in today's automated workplace;
(b) the systems integration needed to achieve these performance qualities; and
(c) the changes in the building delivery process needed to ensure integration (Hartkopf, 1991). The following will elaborate the above conditions.

Assessing What the Users Need

To accommodate future changes and functions depends on how well planners estimate the basic requirements and predict the organizational growth. Knowing users' needs is the basis for management of information technology. Either consultants or in-house staff have to assess what the users need as opposed to what they want in terms of space and equipment, capacity, and flexibility. In addition, the organizational culture and the nature of work should be reflected in the planning. For example, designing an entire open plan office such as the administrative center is different from the attorney office.

Organizational objectives like operational efficiency and easy maintenance can be translated into guidelines for IT planning. Establishing standards of quality can help choosing the right IT products. Afterwards, decisionmakers must carefully evaluate a multitude of available IT products and systems. Projecting the overall budget both in upfront and life-cycle costs will be certainly helpful for choosing the alternatives.

Planning for Better Systems Integration

IT design decisions are typically constrained by the financial factor, especially in speculative buildings. The decision on each IT system is usually made individually. Each system which works efficiently and economically does not guarantee the whole IT infrastructure works in a consistent way. On the contrary, a group of not-the-first-choice products may perform better than a collection of all-the-first-choice products. Unfortunately, most IT systems are

chosen without considering integration issues consistently. Therefore, systems collectively as an IT infrastructure do not work as expected.

The key to IT planning should be system integration. IT planners, engineers, and managers should identify IT components and systems for ensuring the system performance as required. Innovations will be needed to overcome the deficiency of current market products and construction techniques. Simulations and full scale mock-up can help in identifying early problems and reducing unnecessary investment.

Managing the Project Delivery Process Effectively

How different players get involved in the process of managing IT needs no restating. An IT project is generally undertaken through a complete or part of the delivery process from project conception, feasibility study, planning, schematic design, design development, construction documents, construction, to building occupancy. However, conventional processes are no longer capable of ensuring an effective system. The critical need for an effective project delivery process and team decision-making for ensuring better system integration should be considered and implemented (Chiu, 1991).

A team consists of a range of experts (including IT experts) with decision-making power. Shown in Figure 1, a series of steps must be undertaken in addition to existing process. These include:

(a) Mission statement - Given precise project objectives, the design team should prepare a clear mission statement of planning objectives, quality and requirements, anticipating the capacity for change. Meanwhile, the team has to set priorities for the project.

(b) Systems integration I - The team has to explore the possible alternatives for each system. These provide more opportunity for effective feedback in the early decision-making process.

(c) Systems integration II: products and interfaces - More often, one system product does not fit in with the other system requirements, such as the dimension and the capacity. The team should select promising products and interfaces to continue the detailed studies of system integration.

(d) System Integration III: prototyping - It is critical to set up mock-ups for proposed products for final approval and modifications.

Furthermore, traditionally, the field evaluation and specifications relied heavily on experts and instruments. A controlled performance evaluation process, known as the diagnostic process, is integrated with the project delivery process for quality ensurance throughout design and construction (NRC, 1985). Field evaluation techniques such as model assembles and computer simulation, and user occupancy surveys such as POE are used to assess the overall performance of the integrated system.

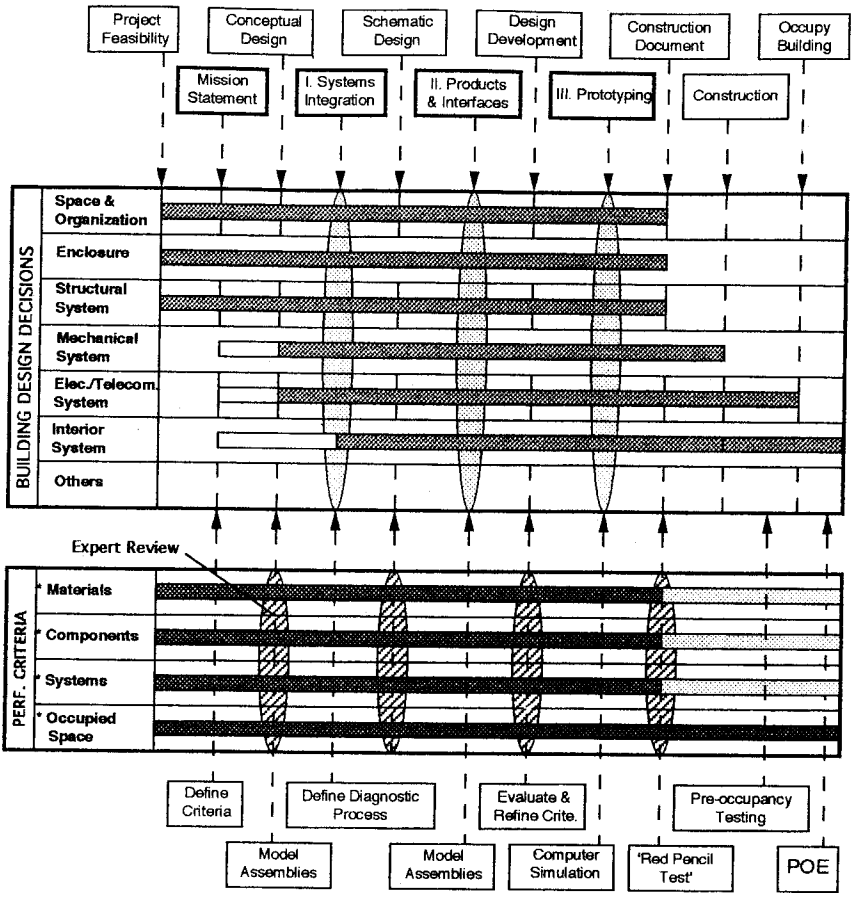

Figure 1. A Series of Additional Steps for Managing the Project Delivery Process Effectively

Using Computer Aids For Information Technology Education and Training

While IT becomes an important element of the work environment, IT is still ill-understood, ill-planned, and ill-managed as mentioned. IT education and training becomes critical for the professions in charge of IT design, plan, and long-term operations. Chiu's study (1991) discovered that computer aids are useful for introducing the concept of performance and systems integration such as information technology and building configuration.

WIREWORK, a Macintosh-based HyperCard program, introduces the basic concept of cabling and wiring, and related management issues. The program is aimed to introduce communications to users such as young designers and engineers through a series of pictorial introduction and simple exercises as shown in Figure 2.

For decision-makers, typical IT questions are: How is cabling distributed? What are the wiring management alternatives and their cost implications? WIREWORK is therefore designed to address the above questions with six basic components: cable type, cable connection, wiring distribution, wiring management, cost implications, and decision-making. It uses scanned images of the typical cables and connection configurations in the existing market to introduce the wiring world and demonstrate how cable are connected. It demonstrates how cable and wire are distributed vertically and horizontally through furniture, floors, and the building. It also highlights the basic wiring management alternatives and the cost implications of different wiring management system, including the first cost and moving cost. Finally, it provides the decision flow to facilitate users' decision-making for choosing the right wiring management system. Through the quick review, users can have a quick scan of the content of WIREWORK. Users only need to follow the straight-forward instruction to access each related topic.

CONCLUSION

From the project conception to operation, a series of decisions is made to ensure the effectiveness of the planning, design and management. Poor decisions about information technology can cost millions of dollars. More importantly, they can prevent an organization from achieving its basic objectives.

As widespread IT changes rapidly, managing IT becomes more complex. It is clear that managing IT depends on the following four factors: how well the users' need is assessed, how effective the project delivery process is managed, how well systems are integrated, and how well computer aids are used for IT training and education. These managerial challenges are then left for the professions to resolve. As the project becomes larger or more complex, the challenges for managing IT become bigger.

By incorporating the above conditions, the future workplace will provide for unique and changing assemblies of recent technologies and work styles in appropriate physical settings, to enhance worker satisfaction, understanding, communication, and overall productivity.

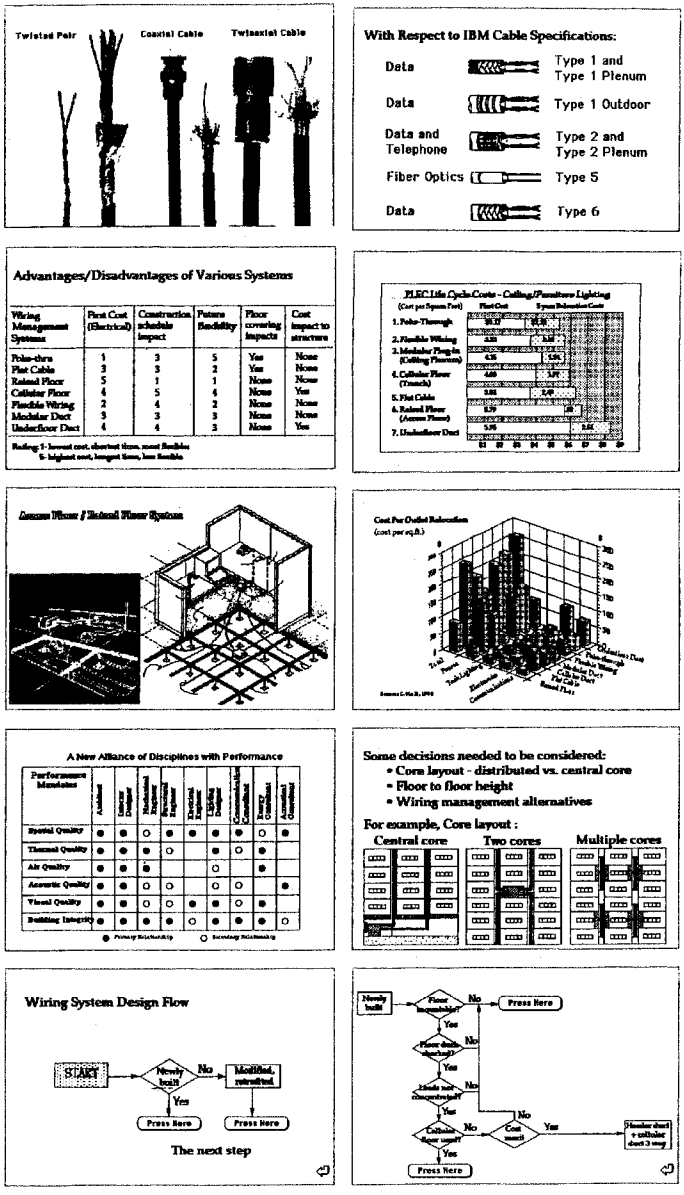

Figure 2. WIREWORK - A Series of Pictorial Introduction and Simple Exercises of the Basic Concept of Cabling and Wiring, and Related Management Issues

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