

Enterprise computing asset management: a case study

Jason Chou-Hong Chen

Associate Professor of MIS, School of Business Administration, Gonzaga University, Spokane, Washington, USA

Keywords

Information technology.
Assets management

Abstract

Information technology (IT) is an essential supportive tool as well as a competitive weapon. Unfortunately, the cost of deploying, using and maintaining computers has also increased dramatically. Over time, the computing architecture has moved from being mainframe-centered towards client/server computing interconnected with mainframes. Consequently, desktop asset management becomes the top priority to such an evolving system of managerial goals, strategies, and implementation tactics. Based on a study of Boeing Company's infrastructure, this paper first discusses issues of computing asset management as well as the technologies used to manage these assets. In addition to presenting the recommendations given to Boeing, an enterprise computing asset management framework is proposed to encompass important factors in this paper.

This project was fully supported by a Boeing Summer Business Faculty Fellowship. The author is grateful to the support team, especially, Mr Jeffrey Wilson, the division IS manager.



Industrial Management &
Data Systems
102/2 [2002] 80-88

© MCB UP Limited
[ISSN 0263-5577]
[DOI 10.1108/02635570210419627]

Introduction

In the early 1980s, Drucker (1980) predicted that "the factory of tomorrow will be organized around information rather than automation". His insight has become a reality today. An organization's prosperity depends increasingly on how it uses technology to expand and exploit its employees' knowledge in order to adapt to a dynamic business environment. Computer systems at any level of organization can enhance the workers' ability to solve problems by providing them with quality information.

While information technology (IT) is an essential supportive tool as well as a competitive weapon, it is quite expensive. Companies have long complained that IT did not improve the productivity of the company (Strassman, 1997). Over the years the costs of managing information, including the costs of computer hardware, software, networks and staff have risen, not declined, in relation to other production costs. However, realizing how information systems may help the company reduce transaction cost and time-to-market, information systems expenditure once again is on the rise. Given the amount of annual expenditure in IT, even a small percentage of improvement from better asset management can be significant.

To reduce cost and increase flexibility, business computing has moved to client/server architecture, using local area networks (LANs) to connect desktop personal computers (PCs) and mainframes. The result is an increased complexity in the system topology. With enormous financial and operational resources vested in such systems, the desktop asset management emerges to be a new and crucial area of technology management.

Computing asset management seeks to reduce IT expenses, increase effectiveness, and increase the company's return on investment (ROI). It can help companies find cost-effective ways to manage IT for generating and using knowledge faster and more effectively. This paper studies issues of computing asset, using the Boeing Company as an illustration. Based on the author's experience with the Boeing Company, this paper studies issues of computing asset management. In addition to presenting the recommendations the author gives to the Boeing Company, this paper also proposes a conceptual framework for describing essential components and their interactions in computing asset management.

IT structure and computing support in Boeing

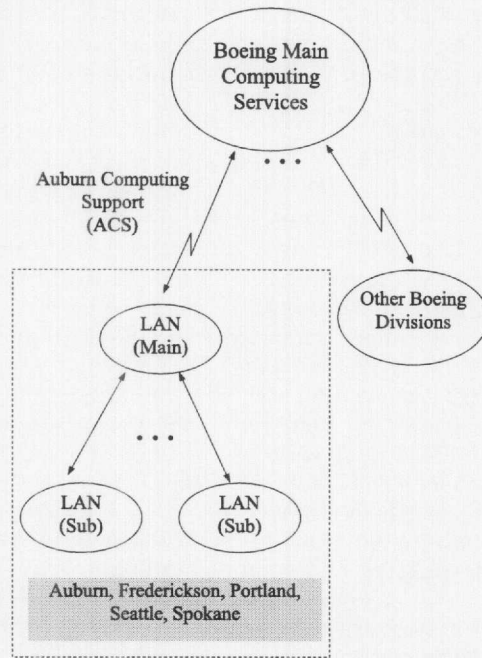
After merging with McDonnell Douglas in 1997, Boeing has been reorganized. In addition to the company offices, there are now four groups: Boeing Commercial Airplanes Group (BCAG); Military Aircraft and Missiles (MAMG), Space and Communications (SCG); and Shared Services Group (SSG). For example, Auburn Fabrication Division is one major fabrication plant for the BCAG. Boeing is renowned for its IT implementation, and in Auburn Fabrication Division desktop PCs, Numerical Control machines and CATIA (a 3-D CAD program) workstations are connected to their sub-LANs that are linked to the main network in Auburn. This main network is then connected to the Boeing's main computing services with other Boeing division networks (Figure 1).

Boards and committees are responsible for determining standards in hardware, software, and networks. These boards and committees are formed according to the needs or the function of the division or enterprise. For example, the BCAG Information Systems Standards Organization

The current issue and full text archive of this journal is available at
<http://www.emeraldinsight.com/0263-5577.htm>



Figure 1
IT infrastructure in Auburn Computing Support
at Boeing



provides the structured process management online, and employees may not only review those standards, but may also submit requests for new standards via a system called Architecture Review Request (ARR). The standards organization supports the mission of the architecture review boards (ARB) to manage the approval of BCAG IT architecture directions (Boeing, 1998a).

There is a class of standards called company-wide information system (IS) standards. These standards are those Boeing standards that have been approved by *all* groups within Boeing. For example, the company-wide IS standards board approves the adoption of software (termed "standard software"), and it is SSG's responsibility to negotiate licensing fees with software vendors. On the other hand, SSG also determines the software purchasing strategy (e.g. the number of PCs, the number of workers or concurrent users) based on enterprise-wide concerns. However, division and/or organization-specific variations are allowed to exist where necessary.

Auburn Computing Support (ACS) helps its customers in the acquisition, upgrading, moving, adding and disposing of computer hardware and software. Its customers are located all over the Washington State. For example, ACS manages customer computer inventories in Auburn, Frederickson, Portland, Spokane, and some offices in Seattle. ACS also manages processes of

planning, budgeting, and requesting for PC equipment in Auburn, Portland and the fabrication divisions in Seattle and Spokane. There are some exceptions, however. For example, SSG manages the ticketing system that handles most of the technical support.

In general, ACS starts its annual budgeting process, called computing capital asset budget (CCAB), in June. Liaisons from each manufacturing business unit (MBU) collect their IS's needs and submit their requests to ACS computing asset management analysts. Aided by their personal forecast with MBU organizational requirements, IS CAD/CAM, and server requirements, ACS proposes the IS budgeting plan to the Auburn Fabrication Finance Department in August. BCAG finance division submits its annual budget to the company offices in December, after collecting requests from its sub-divisions, and the decision is made and parties notified the following January. Once the budget is approved, each individual or department may request via the equipment requirements tracking systems (ERTS). A request form can be entered into the ERTS from which it will automatically inform the management who are responsible for the authorization. An authorized order is then forwarded to the SSG purchasing/order department from where the order is submitted to the vendor. This transaction is done electronically to ensure fast and accurate processing. Once this is complete, vendors ship the equipment to Boeing's receiving department at which the equipment is verified against the purchase order. Finally, equipment labeled with an E number is delivered to each individual or the department (Figure 2). In the following section, we describe an enterprise model for computer asset management and its components.

An enterprise model

Computing asset management is a process or technology that helps manage computer hardware/software procurement and usage, facilitates license compliance, tracks inventory, enables change, or improves overall efficiency in software deployment. When given enough human resources these activities can be handled manually, but a computing asset management tool can automatically manage such applications as inventory control, metering/monitoring software usage and software distribution in a cost-effective way. The model is a visualization of the enterprise computing asset management component and processes (Figure 3).

The enterprise model is a conceptual framework that describes essential components and their interactions. Together with desktop asset management software, the model helps identify ways to reduce costs and improve productivity. The essential elements in this model are described below.

Project development process

A project development process (PDP) refers to all the activities needed to produce solutions in a structured manner. A PDP should be organized around and supported by three major components/concepts: information, knowledge, and change. With some exceptions, most project development activities illustrated in the model are sequential (Figure 4). Each activity interacts with the organization and requires supports. For example, to start the computing asset project, the department/organization should conduct a feasibility study and request for budgets before it can complete the project following the usual system development life cycle.

Knowledge management process

Peter Drucker (Digital Drucker, 1998) suggests that the purpose of an organization is "to enable ordinary people to do extraordinary things". This can be accomplished only if these ordinary people have extraordinary knowledge on the process and, indeed, only those organizations that can create, share and manage knowledge efficiently and effectively among their employees can retain a sustainable competitive advantage. To this end, the emerging powerful technologies, such as expert systems and the intranet, would be helpful in improving the knowledge and skill level of employees. The intranet has been widely used within Boeing to make

information access and daily operations easier for employees. It also enables top executives to communicate with all staffs virtually anytime and anywhere in the enterprise. As a result, a wealth of knowledge and experience is diffused to enhance the capability of all employees. The Internet provides the most popular and convenient vehicle to transfer information and knowledge among people worldwide in the form of the World Wide Web and e-mail. According to a KPMG study (KPMG Management Consulting, 1998), 22 percent of companies currently harness Internet technology to run intranet, while 68 percent say they will by the end of 1999, and 75 percent by 2001.

With this abundance, or even overflow, of knowledge, knowledge management becomes a challenge itself. Harris *et al.* (1998) define knowledge management (KM) as:

... a discipline that promotes a collaborative and integrated approach to the creation, capture, organization, access and use of the enterprise's information assets. This includes databases, documents and, most importantly, the uncaptured, tacit expertise and experience of individual workers.

A KM process framework by the Gartner Group is shown in Figure 5 (Harris *et al.*, 1998). The five KM activities can be further grouped into three subprocesses of *knowledge creation*, *knowledge sharing* and *knowledge application*. The three activities that comprise knowledge sharing – *capture*, *organization* and *access* – are the core of KM and are the most time-consuming components to manage. Knowledge creation and knowledge application rely heavily on the cross-process activity of collaboration, which is generally recognized as intrinsic to KM, but does not in itself sufficiently constitute KM.

Boeing (1998b) recognizes that its strength and weakness are directly related to the knowledge level of its workers, and that the company strongly encourages cooperative efforts at every level and across all activities in the company. The company furnishes incentives in attending many educational and training classes so its employees can constantly broaden their skill portfolio, deepen their knowledge and adapt to new technologies.

Change management process

The third and the most critical module in the proposed enterprise model to computing asset management is *change*. Important components/processes related to this module are:

- culture;
- operational;

Figure 2
A process of request for equipment (RFE) using ERTS

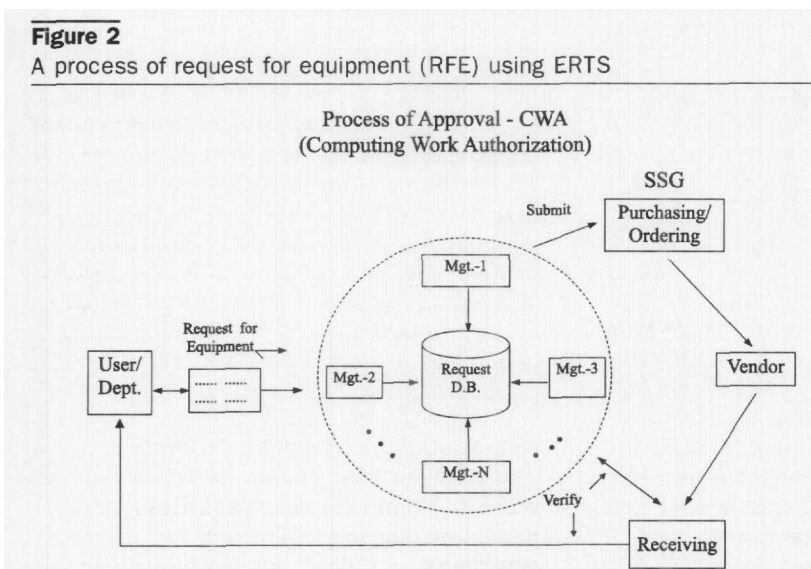
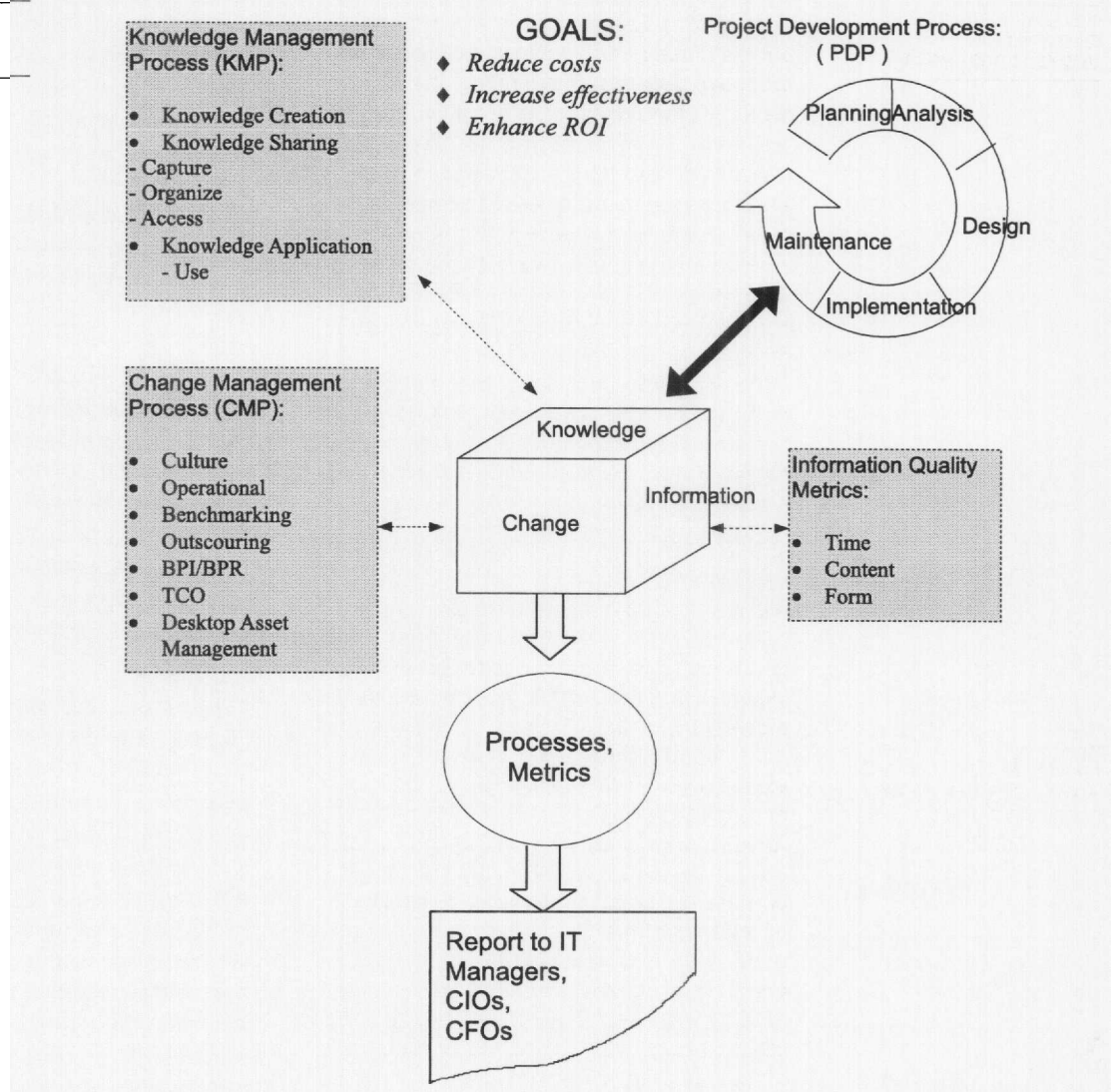


Figure 3
An enterprise model to computing asset management



- benchmarking;
- outsourcing;
- business process improvement, innovation, and reengineering;
- total cost of ownership; and
- the desktop asset management.

With all the restructuring, every company in the twenty-first century needs to know how to *change* and adapt to new business environments, and know how to manage these changes virtually. Its components are described.

Culture

Culture is the way things get done within an organization, and it might include value, politics, or employee morale. It usually reflects employee attitudes toward products, services, and customers. Although changes and innovation are frequently cited to be the mother of all successes, success relies on the

employee bases (e.g. culture) on which the business was built. When values are no longer offered to customers, the culture must change. In terms of IT adoption, employee "buy-in" requires their recognition of the need for change and that they learn to adapt to the new environment. While employees may recognize that culture is the values instilled within the organization by senior management, it is possible for them to respond positively to cultures that emphasize customer service and quality products or services. These values establish the core of a vision and the foundation on which a strong culture is built (Callon, 1996).

Operational change management

The critical role of "operational" change refers to the proactive capabilities for managing distributed computing environment. If designed and implemented

properly, operational change management can make the computing infrastructure more predictable by minimizing the negative impact of changes to an organization's business objectives or technical operations. Without change management, the IS organization commits to a continuous "reactive" or "firefighting" mode of operation (Keyworth and Kirk, 1998). For instance, one MBU manager at a Boeing manufacturing division adopted a new policy to assign and change a supervisor every three months. Such change (job rotation) reflects both cultural and operational change in the production environment.

The operational change management technologies and processes must be able to accommodate the constantly changing technologies, the dynamic processes, and the fluid organizational structure in an IS organization.

Benchmarking

Benchmarking uses metrics for systematically identifying the "best practices" and determining how an organization may adopt such practices. It is a

tool to help businesses achieve its competitive objectives. In general, benchmarking sets goals and objectives by measuring the improvement in processes. Rather than react to changes, benchmarking provides an effective way to proactively manage the change. A successful benchmarking program should (Redman, 1997):

- define the goal standards/objectives;
- report performance metrics/measures;
- identify deviations from peer norms;
- implement corrective-actions "gap" analysis; and
- reevaluate goals periodically.

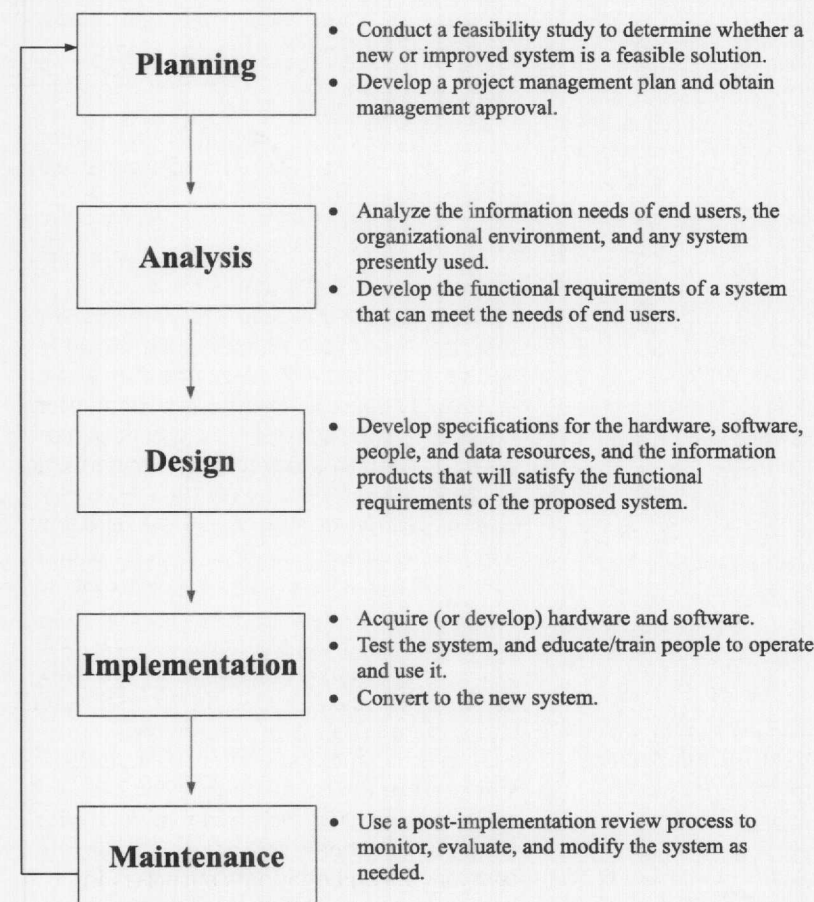
Each benchmarking analysis should provide meaningful and implementable recommendations by analyzing the "gap" between the company's current status and the goal. It is suggested that Boeing should perform benchmarking in the area of (desktop) asset management for a better performance for their IT investment.

Outsourcing

IT outsourcing is when a company turns over all or part of their IT projects to an outside partner. Because some organizations perceive it to be more cost effective than maintaining their own IS department and staff, it has become quite popular. However, if mismanaged, a firm may lose control over its IS functions and be at the mercy of the vendor. Furthermore, proprietary information may be obtained by competitors through leaks. Thus, typically, the business must retain an adequate central IS unit to manage the outsourcing agreement. Mission critical IS functions/projects are not supposed to be outsourced all together.

According to the Gartner Group, future outsourcing will be based more on values added to the business than on cost reduction. In other words, the outsource contract will be for technology or expertise that will return real value to the business. Outsourcing would make perfect sense when companies have a time constraint to complete the project, lack internal resources, have internal political conflict, or have financial constraints (Knowles, 1997; Liebmann, 1997; Zahedi, 1995). For cost-effective outsourcing, managers should focus on the incremental and short-term benefits. Boeing has outsourced some of its IT functions (e.g. computer repairs) to the outsider that provides faster, more responsive and reliable services.

Figure 4
 A project development process model



Business process improvement/ reengineering

Business process improvement (BPI) rethinks management with distinct approaches such as cross-functional management, policy deployment and strategy alignment, whereas, business process reengineering (BPR) requires a fundamental and radical change to the core business processes and key supporting processes. BPR may also change how people work by changing business policies and controls, systems and technology, organizational relationships, organizational business practices, and reward programs. Both BPI and BPR require companies to change how they do business, including the areas of culture, value, organizational structure, or operational procedures.

Many companies conduct BPI/BPR through implementing new technologies. For example, Boeing has been using an intranet as its major communication vehicle and an information base in order to improve the services, speed, and quality of its business processes.

Reengineering can also benefit from emerging technology such as an intranet. In his article "Intranets gives new life to BPR," James (1998) indicates that because of its bottom-up effort, the capacity to share information easily, and the ability to embrace diverse computing platforms, an intranet has helped win employee support in carrying out BPI/BPR.

Total cost of ownership

As enterprises migrate from matured legacy systems to immature emerging systems, the cost structure shifts from the territory of well-understood, properly accounted-for costs to poorly grasped and hidden costs.

Thus, total cost of ownership (TCO) evaluation and control becomes the new mantra.

Gartner Group (Keyworth and Kirk, 1998) was the first to introduce the concept of TCO. It defines TCO as the collective (and usually annualized) cost of providing and maintaining corporate ISs. By using this TCO concept, companies may:

- identify the applicable part of TCO concepts for your organization;
- analyze various "what if" scenarios to evaluate the impact of proposed IT infrastructure changes;
- evaluate a wide range of IT planning alternatives quickly;
- develop budget scenarios justifying IT investments;
- understand the strengths and weaknesses of various IT for identifying areas that can be improved; and
- implement decision support methodologies to further reduce TCO and increase the return of technology investments.

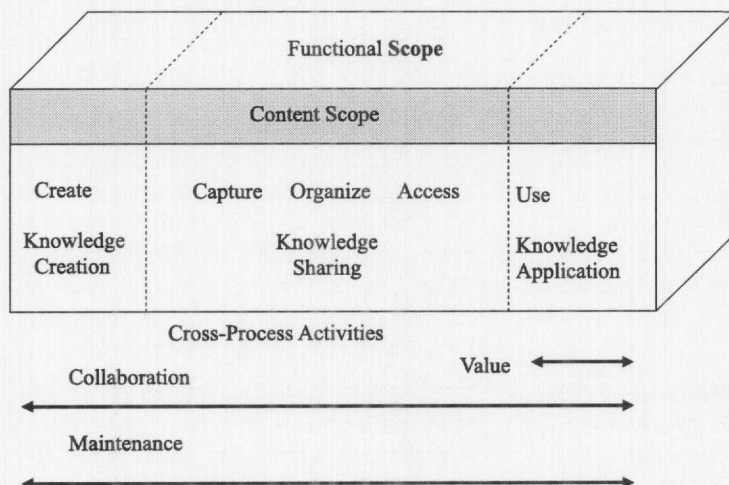
Gartner Group's TCO model measures capital costs, technical support costs, administration costs, and end-user operations costs (Silver, 1997), with each metric subdivided into *desktop* and *network components*. Note that this model produces a general estimate of costs, and enterprises should be aware of the costs that are specific to their own environments.

The capital costs represent all non-labor costs, including capital expenditures such as hardware and software expense items (e.g. supplies, electricity and software maintenance fees). The technical support costs are those incurred by help desk operations, new product introductions, enterprise standards creations, hardware/software maintenance, etc. The administration costs for desktop computers are mostly managerial and acquisition costs, while the administration costs for networks are incurred by traditional LAN administration tasks such as system backup and user administrations. Finally, the end-user operations costs include labor costs that are incurred by the user community (e.g. user training) which are above and beyond those incurred by the IS department. This category includes the cost of time users spend on servicing their own computers.

Since hidden costs, such as users' self-support, are the biggest hurdle for IS management, TCO tools and methodologies may help IS managers identify cost components and eliminate surprises in IT budgeting. According to a study by Gartner

Figure 5

The Gartner Group's KM process framework



Group (Kirwin, 1997, 1998), new and emerging technologies may significantly reduce TCO. At the heart of the savings is the network PC running Microsoft Windows NT 4.0 with the Zero Administration Kit (ZAK) in TaskStation mode (Net PC/NT4.0/ZAK E), and the Java-enabled network computer-client. These network PCs are more likely to be terminal replacements that have focused functionality and are very "locked down". As a result, the cost is about 35 percent less than running a typical (loosely managed) Windows 9x system. Such simplified technology increases manageability and streamlines processes (e.g. reduces training costs). Microsoft (Bernard-Hasan, 1998) also proposes a Zero Administration Windows (ZAW) strategy that would reduce TCO up to 35 percent today and up to 50 percent in the future.

Sometimes the inefficiency of computer usage is the real cost of the system. In addition to hardware/software solutions, Schwartz (1998) proposes a ten-step process to reduce TCO that focuses on setting up the benchmark, monitor usage and match user needs with proper equipment. Highly stressed in his model is that without benchmarking no improvement is possible. Since we can only improve what we can properly measure, Gartner Group's TCO model is a new first step to investigating the efficiency of computing asset management.

Desktop asset management

At least two major efficiency problems exist in desktop asset management (DAM) today. First, most network servers in enterprises are underused, and companies often fail to take advantage of the available DAM tools to handle inventory management, electronic software distribution, and help desk consolidation. Second, there is chaos and a rampant lack of coordination today on desktop computing. Yet, desktop management is still implemented sparsely. Automated DAM tools can collect hardware information from multiple computers, networks, and company sites for managing hardware/software distribution and installation. They can also be used to manage software usage, facilitate license compliance, track inventory, and improve software deployment efficiency (see Figure 6). DAM requires partnerships of customers and suppliers. Here is our framework depicting the interactions of an organization and DAM tools (Figure 7).

The more notable asset management software tools today include *Cenergy* from Tally Systems Corporation, *IT Ledger* from NetBalance, *Asset Insight* from Tangram, Enterprise Incorporated, *NetKeeper* from

Multima, *Tivoli Vision* from IBM, and *AssetView* from HP, and are being implemented faster than originally predicted. Microsoft Systems Management Server (SMS) is a tool that allows network administrators to centrally manage corporate PCs' software and hardware. However, SMS only provides limited functions and, because of the amount of configuration required, it is difficult to use. In contrast, a DAM database already contains most of the popular hardware configurations and software recognitions (e.g. manufacturer name, product name, version number, serial number, model, processor speed and type, RAM, etc.), so its software tool can automatically generate the desired output (Tally Systems, 1998a, 1998b). One solution is to take advantage of the "open" design of SMS and plug in DAM software tool modules as "value-added" components. With a common interface, the training costs can be reduced.

Any DAM software tool should include three major functions:

- 1 inventory: automatically identify hardware and software in the system and their licensing fees, maintenance costs, depreciation, even disposal costs;
- 2 metering/monitoring: ensuring the compliance of license agreement; monitoring user, software usage, and access needs; and
- 3 software distribution: automatically installing upgrade and removing software from the system.

Among these, the inventory information is essential for help desk and financial activities. The metering function reduces the number of licenses a company needs to purchase, reduce liability for software piracy, and allocates software more productively. This function could save organizations with 1,000-3,500 users between \$500,000 and \$1,200,000 annually (Kirwin, 1997, 1998). Software distribution provides the most complete and flexible way to maintain software applications on a network. Finally, DAM software tools should have the capability of "messaging management", that manage and report system usage for electronic mail, Internet, intranet, and fax. For example, it may verify the reliability of e-mail and gather usage data on daily e-mail traffic (e.g. excessive and/or personal e-mails) that may affect the service level of the organization.

Many companies have used DAM software tools and reported that the tools were cost-effective and extremely valuable for forecasting, usage planning, and managing

Figure 6
A Desktop Asset Management (DAM) software tool environment model

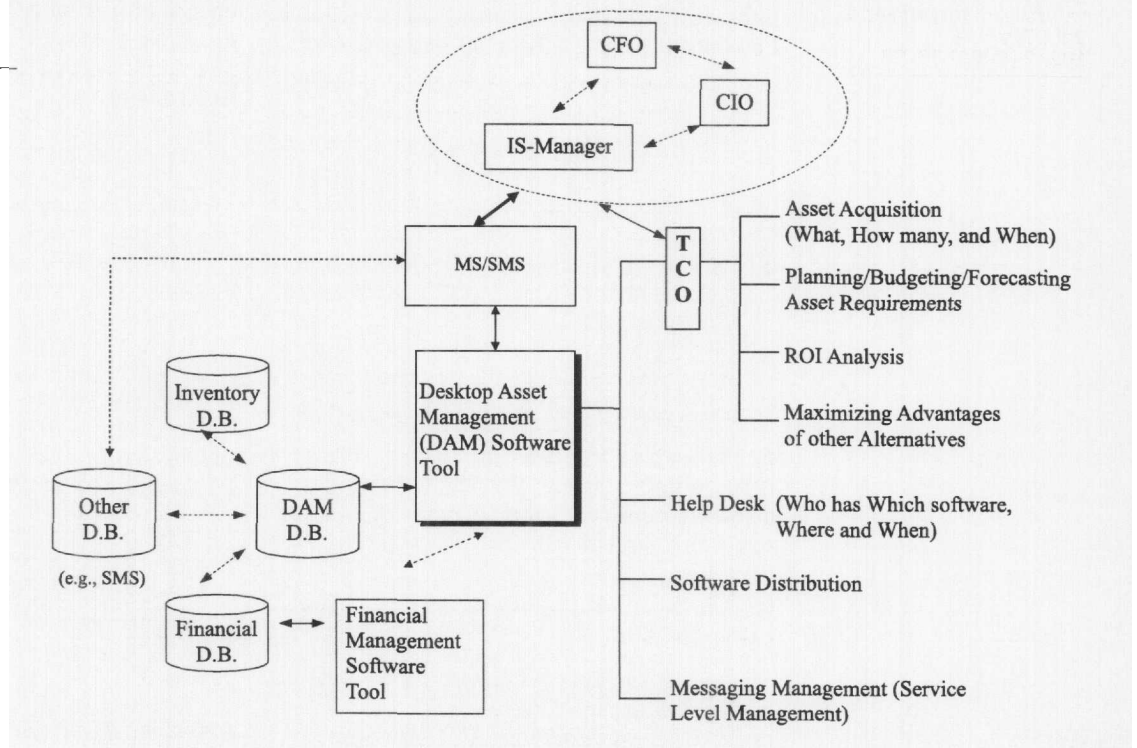
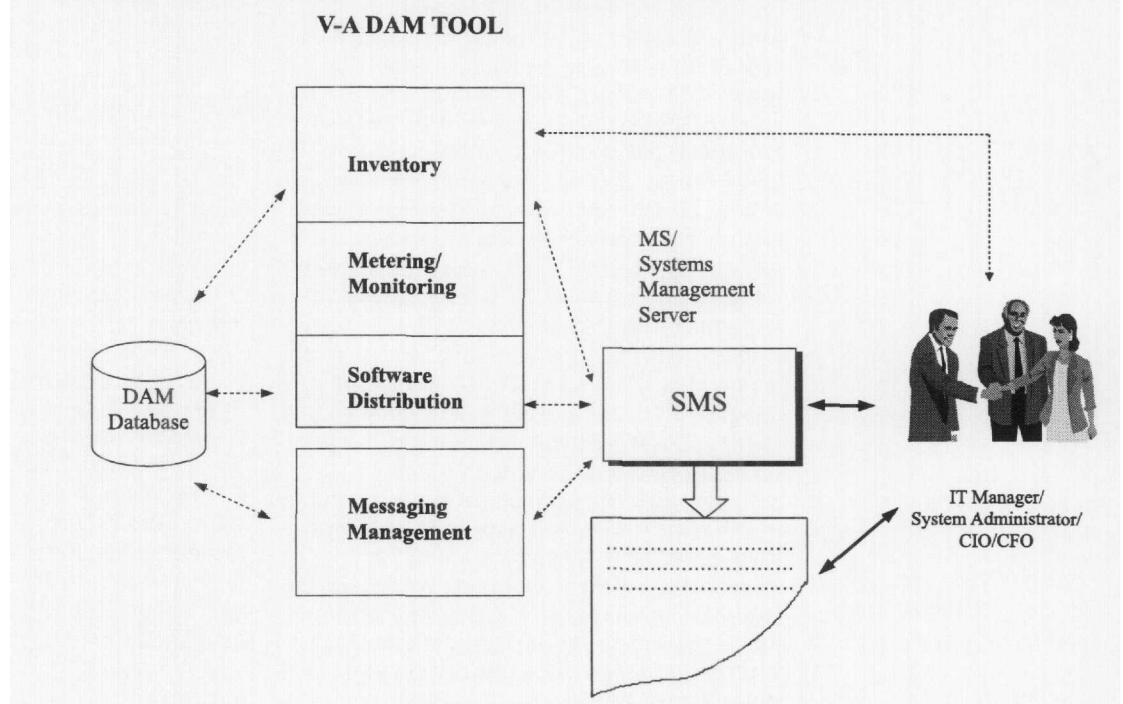


Figure 7
A Value-Added Desktop Asset Management (V-A DAM) software tool model



their IT resources intelligently. Managing computing assets using DAM software tools may be expensive, but not using them can cost even more.

From a long-term perspective, the metering/monitoring functions from a DAM software tool should be taken seriously as a way to reduce licensing fees (and TCO) and

to explore other potential strategic advantages.

Information quality management

It is crucial that the "right" information is delivered to its users on every level of the organization. There are three major metrics:

- 1 time – the information must be timely, up-to-date, and provided as often as it is needed;
- 2 content – the content of the information must be accurate, relevant, concise, and complete; and
- 3 form – the form of the information must be clear, and presented in a desired order and format using an appropriate media.

For managing information quality, Boeing uses both an intranet and the Internet to deliver content in proper forms and in time to employees and external users.

Conclusion

Managing the future of an enterprise depends heavily on the effective allocation of resources to generate profitability and growth. Computing assets continue to change at extraordinary rates, increasing both the importance and complexity of asset management. As new assets are purchased or leased, others need to be upgraded or removed; and as distributed networks expand to new geographic locations, the number of mobile workstations will also expand. The result is a very volatile base of hardware, software and mission-critical applications that must be properly managed. Without such, not only can the intended benefit not be realized, but a company will often throw good money after the bad and work in confusion. That is why enterprise computing asset management should be the highest priority in a company. In this paper, we propose a model as a guide for developing an enterprise computing asset management strategy. In the model, "change" is the most critical concept in this dynamic business environment. This model provides a framework to help end users, IT managers, CIOs and CFOs visualize essential components and processes for managing the enterprise's computing assets, and identify needed metric for monitoring the process.

Desktop computers represent a large financial investment, and, due to its technical complexity, that is particularly difficult to administer and support. However, asset management will not create value unless it is made as part of business practice.

Value-added DAM software tools, with their automated computing asset management capabilities, help improve efficiency on the operational level and create innovation on the strategic level.

References

- Bernard-Hasan, N. (1998), "Reduce your total cost of ownership today and tomorrow", available at: <http://www.microsoft.com/events/winworld/ww15/sld001.htm>
- Boeing (1998a), "2016 vision statement", available at: <http://www.boeing.com/>
- Boeing (1998b), "Mission, goals and objectives statement", available at: <http://inside.boeing.com/mgo/>
- Callon, J.D. (1996), *Competitive Advantage Through Information Technology*, McGraw-Hill, New York, NY.
- Digital Drucker (1998), available at: <http://www.dgsys.com/~tristan/technodrucker.html>
- Drucker, P. (1980), *Managing in Turbulent Times*, Fitzhenry and Whiteside Ltd, Toronto, p. 55.
- Harris, K., Bair, J., Hunter, R. and Rosser, B. (1998), "Introducing the Gartner Group KM process framework", *Gartner Advisory*, Vol. 25, June.
- James, G. (1998), "Intranets give new life to BPR", *Datamation*, March.
- Keyworth, B. and Kirk, T. (1998), "Changing perspectives on change management", *Gartner Advisory*, 8 January.
- Kirwin, W. (1997/1998), "TCO: new technologies, new benchmarks", research notes, *Gartner Advisory*, Research and Advisory Services, 5 December and 7 January.
- Knowles, A. (1997), "CEO/CIO spotlight", *Datamation*, June.
- KPMG Management Consulting (1998), available at: <http://www.kpmg.com/>
- Liebmann, L. (1997), "Better asset management", *INTERNETWEEK*, 5 May.
- Redman, B. (1997), "The importance of benchmarking IT", research note, *Gartner Advisory*, Research and Advisory Services, 21 November.
- Schwartz, K. (1998), "10 steps to a lower PC total cost of ownership (TCO)", available at: <http://www.techweb.com/epc19>
- Silver, M. (1997), "Gartner Group's 1997 PC/LAN model – the basics", *Gartner Advisory*, Research and Advisory Services, 19 December.
- Strassman, P. (1997), "Computers have yet to make companies more productive", *Computerworld*, 15 September.
- Tally Systems (1998a), "Tally Systems cenergy puts Microsoft systems management server (SMS) to work", *Desktop Asset Management*, Series 1, Vol. 3.
- Tally Systems (1998b), "Why desktop asset management matters", *Desktop Asset Management*, Series 1, Vol. 4.
- Zahedi, F. (1995), *Quality Information Systems*, Boyd & Fraser Publishing.