

# **COMPLEXITY: THE MAIN OBSTACLE TO IT INFRASTRUCTURE MANAGEMENT**

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Today more than ever, IT professionals are forced to operate in a complex business environment where success is no longer determined by a single factor, such as getting the best computer system or having the right technical skills. Now, complexity is the norm — and every aspect of the environment is becoming more complex. In the following sections, we discuss the relationship between complexity, dependencies and control, and identify six key areas of complexity. Finally, we provide a short introduction to cost of ownership.

## **Dependencies and Control**

What exactly do we mean by complexity? Today even small IT environments have many components – components that are interrelated. Complexity arises from the interdependencies which increase exponentially as you add hardware and software to your IT architectures (servers, network, storage systems and management systems), upgrade facilities, and expand the scope of processes and organizational structures.

Management and control become business-critical issues as the IT environment becomes more complex. With millions of interdependencies, many are difficult to identify, some are difficult to understand, and others are outside our domain of control. IT infrastructure management is a formidable undertaking, if we cannot understand and control the interdependencies.

## **Multiple Technologies and Protocols**

Not long ago, mission-critical systems all ran on mainframe technology. With the advent of the PC, local area networks (LAN) and related technologies, many business applications moved from the protected realm of the mainframe data center to the free-flowing desktops of users.

At the host or central processing area, UNIX-based midrange computers and workstations arrived, handling scientific applications more gracefully, and serving as the breeding ground for the Internet. In place of mainframes, IT professionals can now choose specialized fault-tolerant or symmetric multiprocessing systems, or even low-end PC-based servers and workstations. Today's hottest gadgets include Palm PCs and other devices that connect to PCs and networks, allowing users to carry data in their pockets.

Once, if your system talked SNA, IBM's proprietary networking communication protocol, you could be understood by virtually all important systems and components. Today, you may need to be fluent in TCP/IP and other protocols. Even your options for implementing networks can be overwhelming: Ethernet, Fast Ethernet, Gigabit Ethernet, ATM, ISDN, frame relay, xDSL, and many others.

Computing systems are no longer restricted to running on yesterday's computing platforms of choice: IBM's MVS or VSE. They may now run on UNIX, Linux, OS/400, Mac OS, Windows, OS/2, NetWare, Palm, Java-based devices, and many other alternative platforms. Even within these platform families, numerous versions and releases exist, and these are not necessarily compatible with each other. For example, UNIX has over 40 variants, even without counting the multiple distributions of Linux. Windows has Windows 3.1, Windows for Workgroups, Windows 95, Windows 98, Windows NT, Windows CE, and now Windows 2000 and Windows ME.

When dealing with the architecture or system deployment strategy, no longer are you bound to use host-based configurations where a large, powerful central computer does all the processing, and users interact via dumb terminals. In today's client-server architectures, each computing resource can be a client, a server, or both at different times. With this architecture, the mainframe is regarded as a fat server, and the dumb terminal becomes a thin client. Alternatively, you can choose a fat client (a powerful PC) that communicates with a thin server, or something in between — or a newer, Web-centered, or n-tier architecture. Each of these approaches presents unique deployment, management, and availability challenges.

### **Multiple Vendors**

They say that the beauty of democracy is that everybody has freedom of choice. If so, nowhere is democracy practiced more fully than in the computer industry. You can buy from scores of vendors whose products implement the same popular technologies and standards, and safely assume that your products will work — *most* of the time, at least. Moreover, with the explosion in global electronic commerce, you can purchase software from anywhere on Earth, via the Internet, and download it directly from its authors. No longer are your choices limited to products sold by dealers and suppliers in your vicinity - you have direct access to the developers.

But freedom can be abused, and even in the best case, it creates enormous challenges for IT professionals, who are called upon to get multivendor products to work together with mission-critical reliability.

### **Varied Users**

Technology is a great enabler, empowering individuals to perform equally well, wherever and whoever they are. Gone are the days when all requests for computations or data manipulation would have to be submitted to the data center. Today, nearly everyone in the organization has access to some computing resources.

Managers of every division can now access executive information systems, data warehouses, and corporate intranets for mission-critical decisions. Employees do most office-related work on PCs. Even contractual or temporary hires are provided at least limited access. And with the growth of the Internet and the proliferation of corporate web sites, customers can access the system for the latest product information or communicate with anybody in the organization via email.

As a result, IT professionals must ensure that their systems take into consideration the skills, experience, and language of a wider range of users than ever before.

### **Multiple Locations**

With the growth of networks comes the challenge of managing computing resources that are physically distant from each other. In the 1960s, the IT organization only needed to worry about its “glass house” — the room where its giant mainframe was protected. Today, you must provide extensive remote user access. You can connect your system to the public telephone network, rent leased lines to remote departments or offices, even connect to the Internet. Your employees want to work from their homes, or from wherever their job takes them — to another building, city, province, or country. You must somehow manage these users also.

### **Rapid Change**

Anybody who follows the information technology industry can attest to the fact that the rate of new product developments is exponentially growing. Companies once went several months without new product announcements. Now, not only do companies introduce new products (or versions of their products) more often, but many more companies are involved. A few years back, you could read back issues of computer magazine and still be confident that what you were reading was current technology. Today, if you read an issue that’s two months old, you know that what you’re reading is well on its way to obsolescence. Web technologies such as HTML and XML rarely (or barely) reach full standardization before they are updated with newer versions.

### **Greater Business Demands**

Information technology is no longer a matter of competitive advantage - it is a matter of survival. Your customers now routinely demand what were once “extra” features and capabilities. “What’s your Web address so I can get more information about your products?” “Do you have an email address where I can send my problems or concerns?” “Can I do business with you electronically, and do away with all these paper forms?” “Can I access my bank account from the Internet?”

### **A Daunting Environment To Work In**

To summarize, IT professionals are living in a world where they must deal with many different products from many different sources, deploying and managing them efficiently, to the satisfaction of a wide spectrum of possible users.

### **THE TOTAL COST OF OWNERSHIP ISSUE**

Why are we so concerned with complexity? There are many reasons, but the overriding one has to do with the cost of ownership. If we cannot control the dependencies, then we cannot manage the IT infrastructure, set realistic budgets, allocate resources, justify expenditures, control costs and ultimately guarantee reasonable returns on investments. We cannot balance value and cost. That is we cannot ensure the IT infrastructure is aligned with the business objectives AND control the total cost of ownership.

In our upcoming articles we will discuss the total cost of ownership in more detail and begin to describe our assess, build and operate approach to balance value and cost – minimize the cost of ownership while maximizing value to the business.

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