

Microsoft's Management Reporting: SAP, Data Warehousing, and Reporting Tools

Daniel E. O'Leary
University of Southern California

M. Lynne Markus
Bentley College

INTRODUCTION

In the early 1990s, Microsoft's financial reports were generated by a proprietary general ledger program running on a mainframe. Financial information was provided to users in the form of preformatted paper reports (e.g., business unit profit and loss statements and other consolidated financial statements such as those found in a company's annual report). The first close of the year took three weeks and subsequent month-end closes took two weeks each. At least half of this time could be attributed to the time-consuming processes of printing, copying, faxing, and mailing paper statements—embarrassing in an information business that prides itself on developing and using technology effectively. Unfortunately, Microsoft's legacy financial systems permitted no improvement in the monthly closing cycle.

The Finance Group wanted to fulfill Bill Gates' vision of putting information at people's fingertips and getting out of the paper-handling business. To do this, they implemented SAP, loaded financial data into a data warehouse, developed user-friendly reporting tools, and they made the data, the reporting tools, and some preformatted financial reports accessible to authorized users via the company's intranet. These technologies have had a substantial impact: the month-end close has now been reduced to four days.

BACKGROUND ON MICROSOFT CORPORATION

Microsoft Corporation, headquartered in Redmond, Washington, was founded as a partnership in 1975 and incorporated in 1981. Microsoft develops, manufactures, licenses, sells, and supports a wide range of software products, including operating systems for PCs, workstations, and servers; business and consumer programs for productivity, reference, education, and entertainment; and development tools. Microsoft also markets personal computer books and input devices. Microsoft is engaged in the research and development of online and advanced technology software products. Microsoft products are available for Intel-based computers and Apple computers. Microsoft's business strategy emphasizes the

This case is a substantially rewritten and updated version of a case originally published as part of Chapter 3. Microsoft Corporation. 1997. *Safety Nets: Secrets of Effective Information Technology Controls*. Morristown, NJ: Financial Executives Research Foundation.

Corresponding author: Daniel E. O'Leary
Email: oleary@usc.edu

development of a broad line of microcomputer software products for business and personal use, marketed through multiple distribution channels.

For many people, Microsoft is synonymous with computing. Almost every computer user in the world has used one or more of the company's PC software products. Only somewhat less well known is the company's state-of-the-art worldwide telecommunications network that supports both Internet web surfers around the world and some 35,000 employees and contractors. Most employees and contractors are highly skilled computing professionals who demand anytime-anyplace access to the company's vast computing resources. Microsoft has more than 40,000 network clients, more than 3,000 servers, and over 20 terabytes of disk storage in the Redmond data center. Despite their substantial Information Technology (IT) skills, Microsoft's internal IT users expected all their IT tools to be as easy to use as Microsoft's commercial software products.

Microsoft's SAP Implementation

Microsoft began implementing SAP R/3 in 1994. The SAP project included the entire financial publishing process from the initiation of financial transactions, including purchases, to the publication of financial results for use both internally by managers and finance staff, and externally by investors. To improve and enable this process, the Finance Group and the Financial Information Technology Group decided on a suite of information technologies, including SAP's R/3 financial modules running on Microsoft's Windows NT network operating system (excluding treasury, tax, and audit applications—the subject of the other projects). However, in order to provide Microsoft managers with access to financial data, a solution other than the direct use of SAP and its reporting tools had to be found. As noted by Gregg Harmon, SAP Project Director for Microsoft, "SAP is a great transactions processing tool, but it didn't meet our objectives for reporting. SAPINQ [SAP's inquiry tool, which lets users drill down into the details of financial transactions] is cumbersome and we thought it would be difficult for the casual user to learn."

Reporting and Inquiry Tools for Different User Groups

Three classes of users were expected to use the financial data processed by Microsoft's new SAP financial-transaction-processing systems: expert users, casual users and shareholders, and investors. Expert users included the accountants and financial analysts from the Finance Group and business units. Microsoft managers and some financial analysts were among the casual users. Each group had different requirements for data reporting, inquiry, and analysis.

Expert Users

Expert users often required direct access to individual financial transactions data, for instance, to create and review general ledger entries. These people became power users of SAP and its inquiry tool, SAPINQ. Accessing SAP required that the SAPSET (SAP's Standard Expense Tracking) client software be loaded on each user's desktop machine. Since Microsoft paid license fees on a per-client basis, there was incentive to limit licenses to accounting and finance specialists who would routinely use the software.

Casual Users

Casual users, like Microsoft managers, needed access to more summarized business unit financial information. Historically, the Finance Group had provided paper financial reports to casual users: 350,000 reports per year were copied, collated, and faxed, mailed, or couriered to multiple locations around the globe. Because this process involved delays,

managers did not have timely financial information. In addition, this expensive and time-consuming process wasted valuable human resources in Finance and delayed the monthly close, which took up to two weeks as of January 1995. Finally, because data were not available in electronic format, managers and Finance-Group specialists had to rekey the data from the paper reports into EXCEL worksheets when doing custom analyses. Conversion to SAP financials opened up the possibility of change.

The project team did not consider SAPINQ to be an appropriate inquiry tool for casual users, especially because Microsoft employees expected their software to have the look and feel of the company's commercial products. Therefore, the project team evaluated several commercially available reporting tools designed to work with SAP. In the end, however, the project team decided to build its own reporting tool called MARS (discussed below), based on Microsoft desktop tools. In addition, the project team designed many preformatted reports that would meet the most common needs of casual users.

Shareholders and Investors

The same basic idea was used for reporting financial data to shareholders inside and outside the company. After each quarterly close, Microsoft's Investor Services published the financial statement on the company's external Internet website. Users could view these data as preformatted statements, just as they would see them in printed annual reports. In addition, they could view various data elements in the form of graphs as well as tables, and they could download the data used to generate the statements (a tiny subset of Microsoft's internal financial information) for their own customized EXCEL analyses.

Microsoft Accounting Reporting System (MARS)

The Finance Group addressed the most common needs of casual users with preformatted reports, available on the intranet for printing on demand. However, the Finance Group also wanted to get out of the business of preparing custom financial reports to meet special needs. Therefore, the project team needed a solution that would allow casual users to reformat the reports and generate their own customized analyses of the financial data in the company's databases. MARS provides that capability.

The idea for MARS came from Taylor Hawes, Senior Manager of Management Reporting in the Finance Group. Hawes found that Microsoft's EXCEL pivot tables could be used to "browse" financial databases. Assistant Corporate Controller Scott Boggs described this innovation as "reinterpreting a spreadsheet as a database browser." Pivot tables were a standard feature of EXCEL, starting with version 5.0. A pivot table is described in Microsoft EXCEL documentation as:

... an interactive worksheet table that quickly summarizes large amounts of data using a format and calculation methods you choose. It is called a pivot table because you can rotate its row and column headings around the core data area to give you different views of the source data ... A pivot table provides an easy way for you to display and analyze information about data already [in databases] ... If you change data in the [database], you can update, or refresh, the pivot table without recreating it [by means of links between the table and the database]. [Once pivot tables have been created, you] can easily customize a pivot table by changing the portion on the source data it displays. You can also choose how a pivot table is organized, formatted, and calculated.

Boggs observed, "Curiously, the power of pivot tables has not been featured in trade journals that write about EXCEL as much as I would have expected" (*MicroNews* 1995).

The project team created formatted pivot tables for all of Microsoft's basic financial statement types, such as consolidated management reports (e.g., product manager reports, channel management reports, and revenue reports). Users gained access to the statements

through MicrosoftWeb, described below, by clicking on a particular statement name or by searching for a particular report. Some sample pivot tables for Microsoft revenue are provided in Figures 1–3.

Microsoft created a Microsoft SQL Server financial data warehouse that contained periodic extracts from the SAP financials transaction database, and other data sources. Using links between the pivot tables and the data warehouse, current data and year-to-date totals could be automatically updated whenever the warehoused data changed (see Figure 4).

Using pivot table functionality, users could change the appearance of the standardized reports, for example, by dragging and dropping fields. Users could save reports, without automatic updating, for presentation or comparison purposes. Users also could use Microsoft Query to specify data elements from the data warehouse to be used in creating their own customized pivot table reports.

MARS may even change the way the world thinks about external financial reporting. Boggs noted:

We've been talking to FASB [Financial Accounting Standards Board] about what providing pivot table capability in investors' financial statements means for GAAP [Generally Accepted Accounting Principles]. What does it imply about standards for publishing financial information when people can reformat and analyze the data any way they want? They [FASB] are pretty perplexed about what this means.

The new online financial data and the MARS reporting capabilities satisfy most needs of Microsoft's users. For example, financial analyst Arvind Bhat needs to access corporate results on a worldwide basis. For Bhat, a typical database query would involve analyzing cost per headcount in different product groups. Bhat says that he knows nothing about how to use SAP. However, he knows how to find and analyze Microsoft's financial data. He obtains much of what he needs directly from the websites of various cost and profit centers, once he has been given permission by data owners to access particular data. Occasionally, Bhat uses MARS to perform a detailed analysis.

Internet and Intranet Reporting

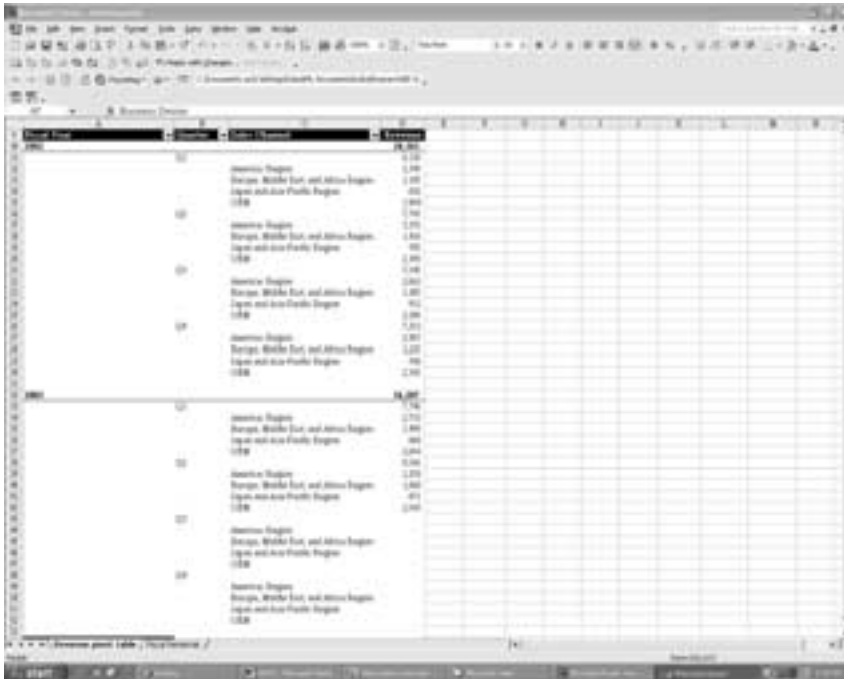
Physically, financial information was stored on different servers throughout Microsoft's internal network. Until recently, those who needed online access to specialized data resources had to identify the data owner, request permission to access the data, and request the file names and location of the server on which the data were stored. Usually, this process and communications took place via email. Unfortunately, this protocol did not accomplish the project team's goals of making meaningful financial information easily available. To meet this goal, the project team made internal financial information accessible via MicrosoftWeb, the company's intranet. Selected financial data were made available to the public at large via Microsoft's public website.

MicrosoftWeb

Microsoft's internal website provides employees access to a wide variety of internal information, including the following links:

- Product Groups
- Product Support
- Sales Groups
- HR & Benefits
- *Services & Facilities*
- Library

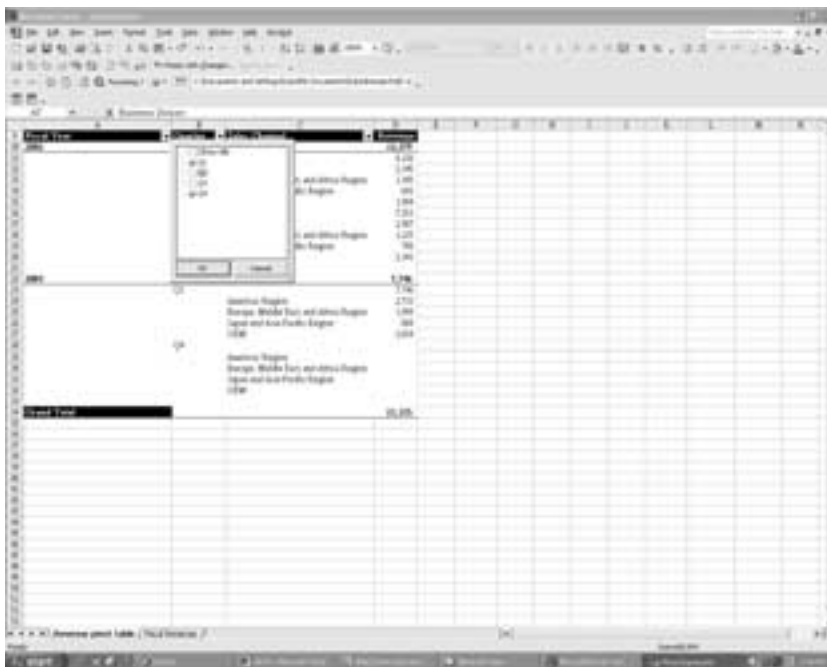
FIGURE 1
Microsoft Revenue 2002–Mid 2003
(By Year, Quarter, and Region)



- Training & Education
- Legal & Corporate Affairs
- *Finance & Operations (FinWeb)*
- ITG
- MicroNews
- The Microsoft Community
- *Mirror of www.microsoft.com*

“Services & Facilities” links to a number of resources, including MS Market, which captures procurement transactions and feeds them into SAP. Users do not have to know SAP codes or terminology to use this capability. MS Market could be used to perform a wide range of activities such as submitting expense reports and placing orders for supplies and services. MS Market displays Web-based forms that allow associates to requisition goods and services from approved vendors, for less than \$1,000, without prior management approval. Managers receive notification of these purchases for budget-control purposes. Most orders go out to vendors via email, since a number of vendors are not equipped to handle direct computer-to-computer transactions. Using MS Market, employees can peruse preferred vendors product/price lists, and they can initiate purchases quickly and easily. Orders are automatically sent to suppliers via email. Vendor’s product catalogs are not made available online, because there is no clear business case for that enhancement. Attempts to use MS Market to make purchases over the \$1,000 limit or to make purchases

FIGURE 2
Microsoft Revenue 2002–Mid 2003
(By Year and Region, for Q1 and Q4)



that require legal approval (e.g., purchases of content for products) generate error messages and call up a Web form resembling SAP's order screen. These forms are automatically routed for the approval before they are released for entry into SAP. These changes have brought the Finance Group much closer to its goal of a "single-step" approval for any purchase.

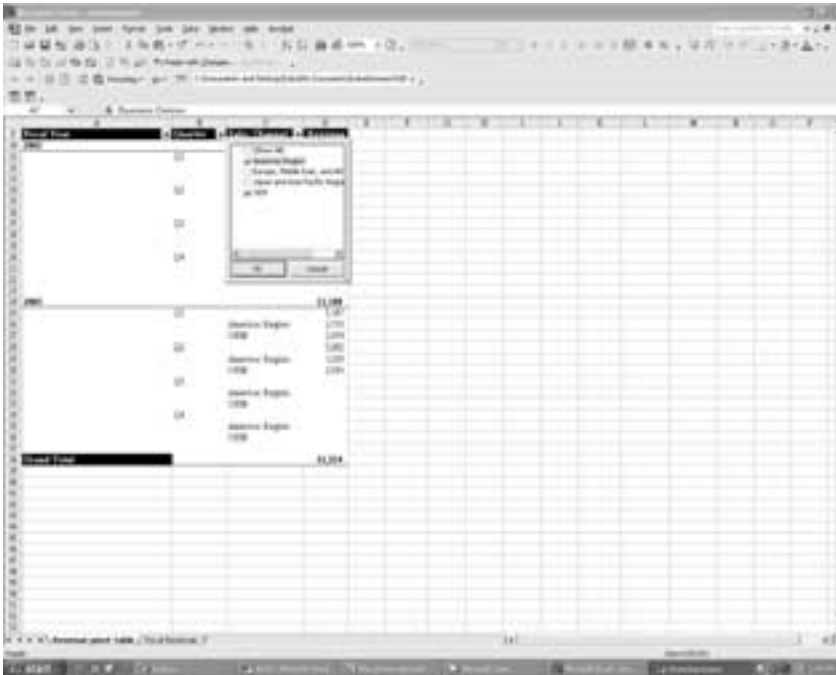
"Finance & Operations" links users to FinWeb, the home page of Microsoft's Finance Group. FinWeb provides access to the preformatted financial statements and MARS. FinWeb provided employees with access to information about each of the different groups in Finance:

- MS Bank
- Strategic Business Decisions
- Business Development & Investments
- Risk Management
- Planning & Budgeting
- *Controller's Financial Information*
- Tax

Scott Boggs explained that a big part of the financial publishing process was making information easy to find:

We have over 10,000 pages of financial information available online in this company. But people couldn't find it. We used to have to send them the URL [uniform resource locator, i.e., the name and

FIGURE 3
Microsoft Revenue 2002–Mid 2003
(By Year, Quarter for Americus and OEM)



machine address of the data file] in email. Now they just type FinWeb and they see everything that's available.

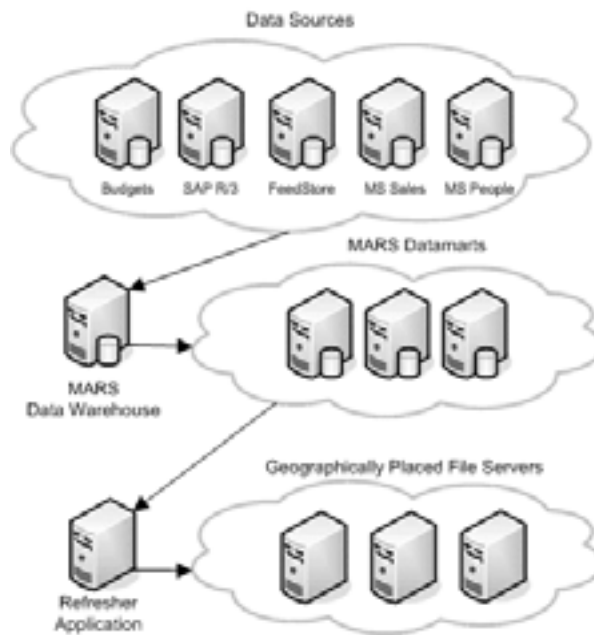
FinWeb is undergoing constant change. For example, during a FinWeb demonstration by a small group of Finance specialists and IT people, Scott Boggs grabbed the mouse and started navigating through the system, “Hey, you know what would be cool here? Putting in email links to the content publishers ... Each group in Microsoft, Finance, HR, etc. is competing for the coolest thing. This is our cool new look—it's changed since yesterday.”

The “Controller's Financial Information” page linked to the following:

- *Financial Summaries*
- Corporate Summary
- Channel Controllers
- Product Controllers
- Worldwide Operations
- Cost Centers
- Marketing
- Corporate Planning
- Revenue Reports
- *MS Accounting Policies (MAP)*

“Financial Summaries” provides access to consolidated management reports that can be selected or searched. In order to ensure that employees are analyzing current data, reports

FIGURE 4
Data Warehouse Integration with Data Sources



usually have notes about their time frame and preparation status (e.g., “current as of [date]” or “preliminary” vs. “final”).

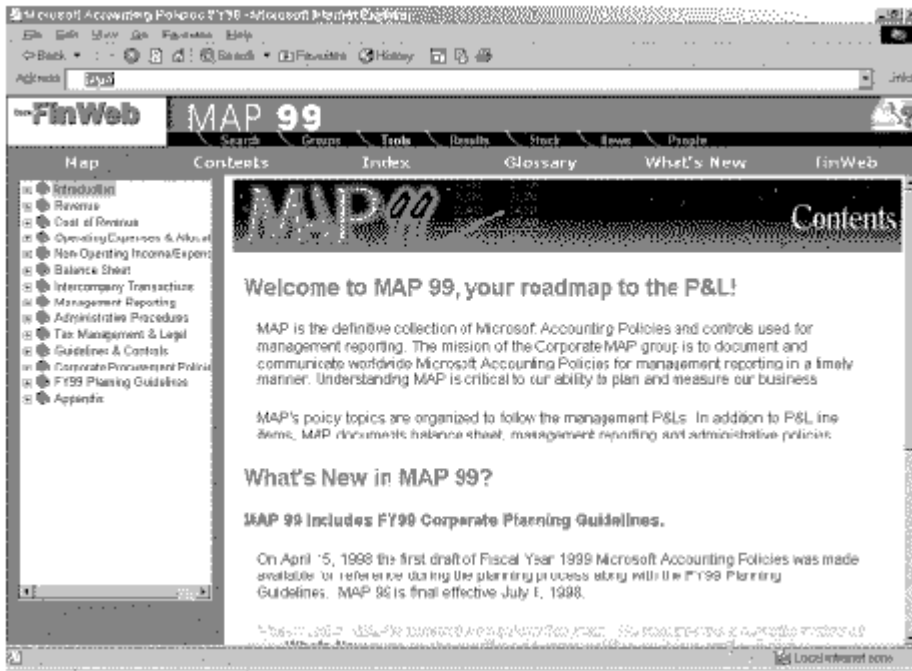
All financial information reported internally for managerial decision-making is displayed in accordance with “Microsoft’s Accounting Principles” (MAP), the company’s internal equivalent of GAAP. The rules in MAP determine, for example, how overhead expenses are to be allocated to products and channels (geographic regions) and who is authorized to approve various types of expenditures. A screen print of MAP is given in Figure 5.

The “Mirror of www.microsoft.com” allows people who are logged on to Microsoft’s internal network to view a copy (or “mirror”) of the company’s external website without having to leave the internal network and go out to the Internet. As a security measure, internal users were logged out of Microsoft’s internal network when they access the Internet. However, this measure made it inconvenient for employees to access certain frequently used Microsoft information (such as product information) on the external website. At the same time, Microsoft did not want to maintain information in two different locations, since inconsistencies inevitably would arise. The mirror capability solved these problems.

WWW.Microsoft.Com

Microsoft has had an external World Wide Web site for years (<http://www.microsoft.com>). The site was an important part of Microsoft’s approach for communicating with customers, partner organizations, potential employees, and shareholders. To improve the quality of the financial information Microsoft provided to shareholders, the Finance

FIGURE 5
MAP



Group's Investor Relations unit maintained a set of web pages that outsiders could access to view, download, and manipulate financial data.

Microsoft's Investor Relations unit won a prize from an industry association for the best investor-relations website. Shareholders could view the company's annual report, its SEC filings, and its quarterly earnings releases. Browsers could choose to display financial-statement data in graphical form, and they could download the financial data as EXCEL spreadsheets or as EXCEL pivot tables. This capability makes it easy to perform their own "what if?" analyses on Microsoft's public financial data.

RISKS AND CONTROLS

Microsoft's new reporting system faced some challenging risks, requiring adaptation through controls.

Network Risks and Controls

Microsoft's security personnel dealt with over 1,500 daily attempts to break into the internal computer systems. As a result, extensive provisions have been made for physical and electronic security.

Perhaps the most important safeguard of Microsoft's internal financial data is the company's network architecture. Microsoft maintains a very large network of connections to the Internet. Many people access Microsoft's website to obtain product information, to download software, and so forth. Microsoft employees need access to the Internet for email

and web access. Microsoft employees also need direct connections to one another and to internal data not accessible to the public. Since Microsoft is a prime target for hackers, the company's internal information would be extremely vulnerable if internal and external data were stored on the same machines or on machines with two-way electronic connections. Microsoft prevents external access to internal data by physically segregating internal and external data on separate storage devices, minimizing the number of telecommunications linkages between them, and restricting the direction of the links. In addition, there are extensive firewalls and constant security checks.

Data Access

Password protection in firewalls is the second line of defense for the internal network. The project team's decisions about who should have access to which data were programmed into network login-authorization software. Passwords are also used to limit access to sensitive internal information by particular classes of users. When users log on to the internal network, they supply an ID and password as personal identification. The authorization software keeps track of the data that particular users are entitled to access. If a user tries to access unauthorized data, access is denied, an error message is sent to the user, and a record of the event is kept. Data owners get weekly reports of the login IDs associated with unauthorized data access attempts.

Microsoft favors the "one-password" approach to security. Some organizations require separate IDs and passwords for different data stores. Opponents of this approach claim that multiple IDs and passwords promote security breaches. Since users have difficulty remembering multiple codes, they often write them down, making it easy for unauthorized users to obtain them.

Information Disclosure, Company Culture, and Rewards

Microsoft employees have the opportunity to participate in a stock-purchase plan. As a result, the company's financial performance is a matter of personal concern to all employees. Employees closely monitor the stock price and often discuss it. At the same time, people are generally well aware that disclosure of confidential information could result in significant company and personal losses. When confidential matters are discussed in meetings, Microsoft executives frequently issue verbal warnings and reminders that the information is Microsoft confidential.

Employees found guilty of disclosing sensitive competitive information are terminated instantly. Those implicated in less serious offences may be sanctioned by the suspension of their stock-purchase options. Knowledge that information disclosure might result in penalties reinforces other controls on misuse of company confidential data.

Training was not expected to be a major form of social control for data disclosure, since no training was planned for the web-based information-access tools. However, the company was considering the development of a one-page "company information policy" to be disseminated to all associates.

Authorization and Information Disclosure

The greatest perceived risks concerned insiders' inadvertent disclosure to outsiders of confidential internal information and violations of associates' privacy. For instance, as noted by Arvind Bhat, Senior Financial Manager in the Finance Group, "The installed base of Windows 95 is a very key number for analysts and the public."

While most Microsoft associates know that confidential information should not be disclosed, in a particular instance, some people “might not know what they’re dealing with,” said Bhat. In other words making financial information widely available internally increases the risk that individuals might unintentionally disclose proprietary information, thus harming the company and themselves.

As a result, project team members gave great thought to access authorization procedures. The SAP R/3 system itself facilitates extremely fine access restrictions; for instance, each user ID could be granted or denied access to each type of data. However, project team members believed that making such fine distinctions would make maintenance difficult. Instead, they preferred to control access by business unit membership. As a result, they found themselves providing broader access to financial information than they might otherwise have done. When Microsoft’s philosophies were combined with SAP features and restrictions, each individual authorized to get information about some aspect of a product category or a geographic region could gain access to all information about that product or region. For example, a manager working with Windows 95 would have access to data about all operating-systems products. A manager in Spain would have access to information about all European countries. Finance Group members believed that the risk of such broad data access was not unacceptably great. The most valuable and vulnerable information was joint product/market data—for example, the U.S. sales of Windows 95. Only a handful of people in the company are granted routine access to both product and market data.

In some cases, people have legitimate needs to access data outside their direct areas of responsibility. In those cases, the individuals had to request special access to particular data sets from data owners.

Periodic Lockout and Warnings

Each time the online financial statements were accessed, a pop-up box displayed this message: “Security: Financial reports are confidential and subject to insider trading rules. Since security is in place, you may not have access to management reports and you may receive an error message.”

The user was required to click “OK” in this box in order to proceed with reading the financial information. Users may fail to read or attend to these messages, but there is no provision for automatically overriding them.

During the two-week blackout period preceding quarterly Security and Exchange Commission (SEC) reporting, only a handful of corporate officers were permitted to access the financial reports. Access was determined by password authorization.

Another control feature involved automatic warnings to people who are browsing financial data. For example, the FinWeb page announces to users, “Welcome to the Microsoft Finance Homepage, your directory for finding Finance information and services. Since much of the information that we publish is Microsoft Confidential, security is in place on many of the servers you may be accessing. If you have any questions or comments, please email ...”

Controls Built into Systems

By building controls into the systems, Microsoft has achieved some improvements in its financial and purchasing processes with little or no increase in the human resources in the Finance Group. At the same time, it is easier than ever for Microsoft associates to conduct and monitor financial transactions. Both increased controls and ease of use have been achieved simultaneously by making resources like MS Market available on the

MicrosoftWeb and by building in improved practices and control mechanisms. Rod Winters, Audit Services Manager, said, "We want to clamp down the systems that permit unauthorized activities, rather than clamping down on the people."

Training

High levels of IT skills made it possible for Finance and Finance IT to roll out new capabilities to users in other departments. For instance, prior to the introduction of MS Market on the Microsoft Web, Microsoft associates had been familiar with eForms (formatted electronic mail) for making purchase requests and filling out expense reports. When eForms were replaced by Web Forms, it was not necessary to conduct any training. When people tried to use the old eForms, they got a message that told them to use MS Market and gave its location on the MicrosoftWeb. As noted by Aidan Waine, "The Web is intuitive; besides, people at Microsoft are accustomed to using new and prerelease technology. We get prizes here for finding bugs."

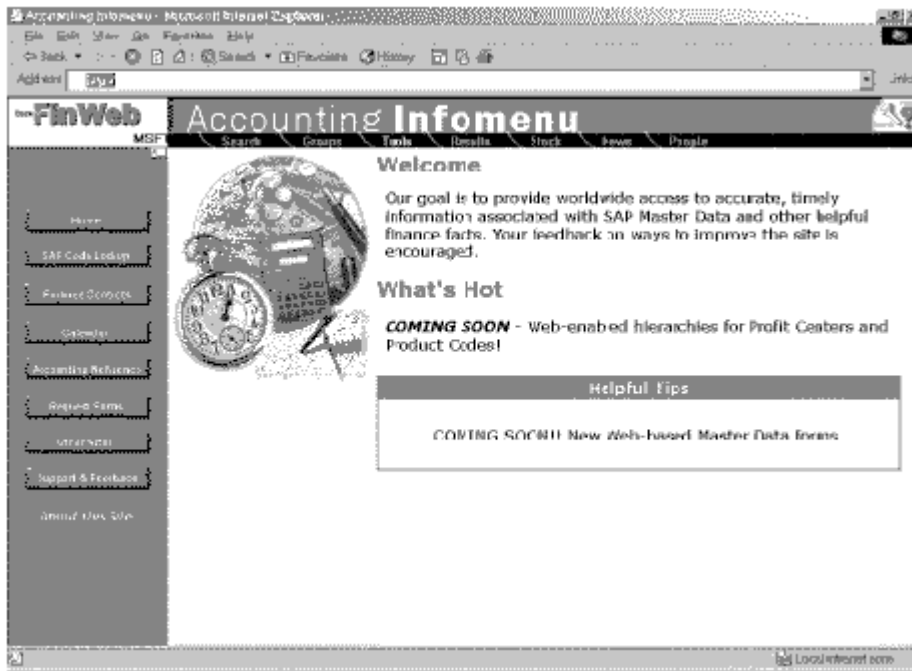
RELATED ISSUE

Microsoft's reporting capabilities came to public attention in January 1999 during the Microsoft antitrust legislation hearings. During his testimony, Richard Schmalensee, dean of the Sloan School of Management at MIT, indicated that Microsoft did not keep track of the profitability of Windows software because the company had an archaic accounting system. Schmalensee observed, "They record operating-systems sales by hand on sheets of paper ... Microsoft's internal accounting systems do not rise to the level you would expect from a company that is as successful as it is" (*Wall Street Journal* 1999, B6).

FIGURE 6
FinWeb Page



FIGURE 7
Accounting Page



The government's lead trial counsel, David Boies, asked Schmalensee, "You mean Microsoft does not have any records that show how profitable its operating system is?" (*Wall Street Journal* 1999, B6).

Boies later asked Paul Maritz, reportedly one of Microsoft's most powerful executives, the same question. Maritz insisted that Microsoft does not calculate profits on particular products. When Boies asked if there was "any estimate at all" of the profitability of the Windows versions, Maritz conceded, "I certainly consider them to be very profitable" (*Wall Street Journal* 1999, B4).

UPDATE

As noted in this paper, the systems developed here were under constant change. For a recent assessment of MARS see:

<http://www.microsoft.com/technet/itsolutions/msit/operations/MARSTCS.mspx>
<http://www.sqlmag.com/articles/index.cfm?articleid=48743>.

Alternative views of both FinWeb and the accounting page are provided as Figures 6 and 7. The basic structure discussed in this paper remains the same.