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Kenny Lee
Nanyang Technological University

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OPEN SYSTEMS TECHNOLOGY AND THE TRANSFORMED
BUSINESS ARCHITECTURE - THE
ACCOUNTING SYSTEMS PERSPECTIVE

Kenny K.F. Lee
Senior Lecturer
Auditing & Information Systems Division
School of Accountancy and Business
Nanyang Technological University
Nanyang Avenue, Singapore 2263
Republic of Singapore

Tel. (65) 799-5686
Internet AKFLER@NTU.VAX.NTU.AC.SG
Fax (65) 791-3697

ABSTRACT

Within today's corporation, IT managers are increasingly incorporating open system standards into their technology infrastructures. The resulting more open, flexible IT infrastructures create a platform or technology foundation that enables the implementation of new application architectures, enterprisewide integration of diverse fiefdoms of data and applications, and most significantly, the integration of new information technologies into the reengineered organisational architectures.

In manufacturing, open standards are pervasive and the implementation of new-generation open, applications software called MRP II, or enterprise resource planning software, have had far-reaching implications for the manufacturing function, as well as contributed towards transformational organisation performance in terms of time to market, innovative product development, cross-functional performance, improved quality, etc.

Drawing a parallel with the manufacturing experience, this paper explores, for the current generation of open architecture, *Unix*-based financial accounting applications software, if this has also been the case for the accounting function. It discusses four cases of organisations, all leaders in their respective industries/sectors in some detail, measuring the benefits of the systems that were implemented in terms of their organisational impact. Finally it reviews the findings for the current-generation *Unix*-based accounting software in the light of the new generation of open-architecture accounting software that are currently lurking in the wings.

INTRODUCTION

Competitive Advantage and Organisational Transformation. Based upon ground-breaking management research conducted into the likely impact of the business environment

upon management styles and organisation structures in the 1990s, the MIT Sloan School of Management [5] predicts that business organisations in the 1990s will need to address issues as - the need to rethink the core of their business and to develop bold new business visions; to reengineer their business and key processes; to evolve new networked organisation forms and teamworking linked by the information technologies; to accept the changed nature of work in the information age, and of the strategic impact of electronic networks and integration beyond the boundaries of their business organisations in the context of new business alliances; the use of such business networks to shift the strategic scope of their business; and the new role for organisational leadership given this context. A formidable challenge indeed for managing in the 1990s - one in which Information Technology will have an integral and integrative role, and open systems a foundational one - as companies in the US and the UK as well have discovered.

Open Systems key to Flexible IT Platforms. British companies have already been gearing up the last few years to face the challenge of doing business in the new market dynamics of Europe 1992 and beyond. In marketing terms, business organisations will now need to address the new Europe as a single global entity/region, an environment quite different from that previously in which each country was treated as an individual market. Given these new business dynamics, many companies have discovered that they had to completely reorder their hierarchically structured organisations and processes in order to transform their organisational performance, and to effectively compete in the new EC.

The business climate of new economic Europe is shaping the strategic vision and organisation structures of these British, and their European, competitors. These companies are also aware that to underscore their new organisation forms that there will also need to be new, redesigned IS applications positioned upon a flexible, open IT infrastructure - "flexible" because given the current state of flux in implementation business organisations

were unlikely to be able to adequately predict what doing business will really be like in the new EC, nor what type of IS applications such a future will bring.

The bottom line appears to be that, as businesses prepare for the 1990s and reengineer their business architectures in order to become more customer-oriented and to improve their competitiveness in terms of time to market, new product innovations, and new service levels, they are actively repositioning their IT infrastructures upon an open standards backbone.

ENTERPRISE COMPUTING AND OPEN STANDARDS

Business transformation involves not incremental change, but major change on many levels at once [3]. The contemporary literature [1, 3, 4, 5] suggests that the process begins with the articulation of the business vision by executive management - this is a vision of how the company should be run in order to survive and compete in the 21st century - that is then used to drive the design of the new or transformed business architecture. The new business architecture in turn provides the basis [4] for specifying the IT architecture that will support the strategic thrusts of the business.

The IT infrastructure is the platform upon which the IT architecture is developed. Being the shared or common part of the IT architecture [21], the IT infrastructure needs to be open and flexible so as to support the cross-functional integration of existing automation, to support the rationalisation, simplification, and rerouting of existing business processes, and to support the additional layers of new technology that are essential to competing effectively in the marketplace.

Open Standards. Today's large computerised multibusiness enterprise that operates various information subenvironments which subscribe to diverse sets of proprietary standards within the same organisation presents a typical example of this problem of heterogeneous standards. Historically, such situations arise from stovepipe decisions taken in regard to IT resources in an earlier departmental computing era, when the focus had been on the functional pieces of the IT mosaic. The legacy today is incompatible processes, data, and technology, and the ultimate IS director-IS integrator goal of seamlessly integrating and rationalising all processing and information resources across the enterprise, the vision of enterprise computing, continues to remain elusive - the world of information systems and technology, in terms of common standards, is quite unlike that of telephone's, television's, or broadcast radio's, where common standards have existed for a good number of years.

The 1990s however promise to be a decade of significant progress for open systems, those systems that are built upon public (non-proprietary) operating systems, user interfaces, application standards, data and networking protocols. In the context of en-

terprise computing, several models of "open" systems, or seamless enterprise connectivity, may be gleaned from the research and professional literature. These may tentatively be classified into vendor Enterprise Architecture approaches (e.g. Digital's NAS, NCR's Cooperation, etc), database vendors' data-integration approaches, the outsourcer's system integration approach, the networking approach, the currently fashionable "middleware" approach, and finally two enduring approaches most commonly associated with the term Open systems, the *Unix* or non-proprietary operating system standards approach (and upon which this paper will focus), and the data communications standard, OSI. These lattermost two models are discussed briefly as follows.

The Unix Movement. Recent past years have seen encouraging progress for Open Systems. The process of standardisation is now well advanced especially on the systems software front - and *Unix*, after a slow start - is now a major feature in computer industry developments. The operating system has become the standard multi-user OS for small to medium-sized minicomputers, and there is now available a substantial third-party commercial applications base - including that for accounting software. Virtually all hardware vendors offer *Unix* today, and for all practical intents and purposes, the OS has arrived.

OSI Progress. Closely related to the *Unix* developments in the data communications area are the standardisation moves in the telecommunications arena, where ISO's OSI scheme has also made significant progress, as reflected in the recent implementation of some real OSI standards-based software packages. In the meantime TCP/IP continues to hold the de facto connectivity standards fort.

The operating systems standards and telecommunications standards areas aside - database standards, hardware and peripheral interface standards, and user interface standards, as well as those standards in other facets of information technology are also enjoying unprecedented acceptance.

Vendor Enterprise Architectures and Technologies. Of the various models of enterprise computing, the most workable model is that as presented by major vendor enterprise architectures like NAS, New Wave, and Cooperation. The underlying concept presented in the various major products is basically similar - distributed processing among many different systems within a common, integrating environment. At present such enterprise architecture products are proprietary, however with the maturing of open standards and as more and more products are released that are built on both open and proprietary platforms, we are increasingly witnessing a higher degree of overlap, or commonality, of standards, and a gradual opening up of the vendor architectures.

New Applications Architectures. These new integrating, more open enterprise computing environments, including the vendor environments, are host to a variety of contemporary technologies as client-server computing, dis-

tributed databases, heterogenous access standards, data repositories, networks and data communications, E-mail, network management, and standard hardware interfaces.

Within the business enterprise, such technologies have laid the foundation for a new applications architecture - client-server computing - for a new generation of IS applications. Such new-generation business application software (such as that in manufacturing) take advantage of the new, more open vendor enterprise architectures and of their enterprise technologies as itemised above in their basic software architectures.

Given this scenario, there are interesting implications for traditional "stovepipe" applications as accounting's and human resource management's, amongst others. But before getting into that it is worthwhile to first take a leaf from the CIM/manufacturing experience, where new-generation manufacturing software have begun to transform organisational performance in U.S. manufacturing corporations.

APPLICATIONS IN AN OPEN SYSTEMS ENVIRONMENT - The Manufacturing Experience

In its heyday, U.S. manufacturing enjoyed profitable product life-cycles of four to seven years and scant competition from overseas. The situation was no different in Europe. Today's sobering reality is intense global competition with product life-cycles of less than two years; time-to-market is crucial, and cost, price, service, and quality pressures are enormous. Given this scenario, companies have taken a new look at how they work, and many have concluded that the survivors of tomorrow will be manufacturing enterprises that have developed flexible management and information structures that are capable of quick action and response.

Integrated Manufacturing Systems. Information in such enterprises will be gathered and rapidly distributed throughout the manufacturing process and beyond - to be made instantly accessible to product designers, manufacturing engineers, shopfloor supervisors, sales and marketing personnel, executive decisionmakers, and even customers and suppliers. Such capabilities call for the implementation of a highly automated flow of computerised information between people and applications, and the integration of technologies as diverse as workstations, personal and mainframe computers, controllers, barcode readers, robots, sensors, etc (and all frequently from different suppliers), into enterprisewide networks.

New-generation Software. Already, a new generation of manufacturing MRP II software called enhanced MRP II (Manufacturing Resource Planning) or ERP (Enterprise Resource Planning) systems are being introduced that make enterprisewide datasharing possible. Many of these systems will run within available enterprise architectures as SAA and NAS, and because of the user demand for open architectures, they will increasingly operate on *Unix* platforms as well. Typically they incorporate client-server architectures, GUIs, RDBMS' with SQL for ease

of use, and also technologies as multiple database support, 4GLs, front-end systems for decision support, automated EDI, interoperability with multiple platforms, product configuration management, CAD integration, multiplant MRP, and standard APIs.

Manufacturing Transformation. Made up of as many as 18 modules in some instances, these enterprisewide applications are effectively enabling new, horizontal customer-driven processes to be developed using a combination of management techniques like concurrent engineering, JIT manufacturing, TQM, and business process reengineering (BPR). The result has been leaner organisational forms, team-based decision-making, and order-of-magnitude benefits in the areas of customer service, product delivery, cost, and quality.

ACCOUNTING SYSTEMS IN THE OPEN SYSTEMS ENVIRONMENT

Whilst a major IS mission may be to achieve highly integrated systems in the manufacturing area, over in the accounting function highly integrated systems are nothing new. Accounting is a highly information-intensive area and has traditionally been the first function to be computerised in the business enterprise.

Current-generation Accounting Software. The current generation of accounting software installed on minicomputers and mainframes reflect this heritage. They are stable and comprehensive, having been conceived and developed, mostly on proprietary platforms, in the 1980s or earlier, and they share a common functionality in terms of performing the basic accounting functions. However most such current-generation systems have seen considerable enhancement the past few years and are already so packed with features that little room is left for further development.

Unix-based Accounting Software. The available *Unix*-based accounting software share many of the stability characteristics of this current generation of accounting software, as well as much of their functionality, but they possess additional advantages of portability - being able to operate on anything ranging from desktop architectures through large minis; of the *Unix* superior multi-tasking abilities, of online capabilities in some cases, and of the more contemporary technology features as GUI-like interfaces and RDBMS-based 4GLs. These lattermost features are reminiscent of some of the characteristics of the latest new-generation Accounting Systems, or what are being impatiently heralded as "the Accounting Systems of the 90s" (see final section).

The Contemporary Literature. The new-generation Manufacturing systems running on open infrastructure-enabled applications architectures such as client-server platforms, GUI interfaces, and RDB backends, etc have featured in order-of-magnitude organisational changes.

The available contemporary literature (Hammer[8], Andros et al[16], and others[14, 20]) on reengineering the Accounting function

have identified benefits as dramatic improvement in transaction processing time, improved customer service, considerable reduction in manpower, a reorganisation around the reengineered processes, simplification and elimination of many of the old procedures, and the deployment of enabling technologies as networking, imaging, and CASE, as well as increased front-end functionality that empowered frontliners to increase the scope of responsibility undertaken.

The classic example is that of the Ford Motor Co.'s accounts payable system. As Hammer[8] recalls it, the top management at Ford, in common with many major organisations at the time, had major cost-cutting measures and downsizing/outsourcing forced on them, which caused them to reevaluate and to reengineer decades-old processes employed in their respective businesses. Some of the affected processes at Ford included traditional accounting processes like accounts payable and accounts receivable.

Ford was able to drastically redesign its accounts payable procedures and to achieve staff reductions of 75% in its accounts payable area - from 500 staff down to 125. Mazda's efforts have even been more spectacular, and they manage with only 5 in their accounts payable department.

Major common characteristics and issues associated with such and other documented exercises were that the redesigned processes were cross-functional, they were customer-oriented, their deployment called for the formation of a cross-functional team with committed top management support, and their development called for the application of a (BPR - Business Process Reengineering/Redesign) methodology. Such issues, amongst others, had to be taken into consideration in undertaking a successful BPR exercise.

Conventional Accounting. On the other hand the benefits of conventional accounting automation are associated with the familiar benefits of productivity/efficiency improvement, and are well-documented in the traditional, and easily available, IS literature.

THE STUDY

Presently a new wave of accounting systems, similarly-endowed as their new-generation manufacturing cousins, are waiting in the wings. Are they likely to achieve, or to help contribute to, similar order-of-magnitude organisational changes? Also how good are the present generation of *Unix*-based accounting software?

Local Application. The local data processing situation is presently at that stage where a significant number of installations in the "*Unix*-class" market, i.e. those organisations using hardware in the mini- to mid-size computer range, are experiencing the need to replace their aging hardware. Numerous such installations have been reported as having migrated to *Unix*-based computers, where they proceed to run the current-generation *Unix*-based accounting softwares alluded to earlier.

The purpose of the study was to ascertain the type of benefit realised by implementing the existing generation of *Unix*-based accounting systems, and the impact of such systems upon the host organisation structure at various levels.

Methodology. Four major organisations, all leaders in their respective industries or industry sectors, were selected for study. A three-part questionnaire was used as basis for interviews that were initially conducted over the telephone, and followed up with field visits and more detailed interviews with IS managers/senior IS personnel and key system users. Mini case studies of the four organisations are cited in the next section.

Questionnaire Construction. The first section of the three-part questionnaire contained open-ended questions of a general nature designed to establish the organisation's business background and its technology and applications environment, whilst the second and third parts contained the key applications and organisational impact questions.

The second and third sections were prepared on the basis of a search of the traditional literature (as discussed in the previous section) for the characteristics of the benefits relating to the automation of conventional operational-type (accounting) applications, as well as of the contemporary literature (also see previous section) for characteristics of the benefits of the BPR-type applications respectively.

In the former case, the traditional characteristics associated with the conventional computing benefits model have been well documented in the available literature (Wetherbe's PIECES framework, Senn's Five Cs, and miscellaneous others). Building the characteristics for the BPR benefits model in regard to the latter (third) section was more challenging, and these had to be drawn from papers by Hammer [8], from available case descriptions [14, 16, 20], as well as the BPR literature [1, 17].

The second section also comprised questions that examined - given that the accounting applications were of the conventional operational and management control-type automation - if their implementation had any impact upon organisation structure at individual, departmental, or organisation-wide level. The third section in like fashion contained questions that probed for evidence of benefits of BPR-type applications, and similarly assessed their implementation impact on organisation structure.

Findings. From the organisations' response to the questionnaire, the benefits of implementing *Unix*-based accounting IS were then categorised into one of the two benefits models discussed above (i.e. conventional vs. BPR) and the impact of implementing these systems on organisational structure assessed. These findings are discussed at length two sections on.

THE CASE STUDIES

Example #1. A large statutory board successfully downsizes its payroll application for over 1,000 employees from a proprietary, standalone mainframe onto a *Unix* workstation, following which the application is integrated into the organisation's other accounting software that is resident on other mainframes supplied by a major vendor. The operation is highly successful, report the users, having achieved benefits of simplicity of operation, increased functionality, and reduced operating costs. Reasons for the migration were twofold - the replacement of a dated, batch-oriented application with a superior, more flexible one; and second, which was a deliberate decision to position the new application onto a more open platform so as to achieve a seamless integration with the other accounting applications resident in the main network. The new system would plug into the organisation's large local area network, and overcome the interfacing problems of what was previously two incompatible platforms. Now the application may be accessed from any authorised workstation within the net. Further its *Unix* platform assures future portability, scalability, and ease of software enhancement.

Example #2. The second example is that of a large publicly listed organisation dominant in its industry and enjoying a turnover of around \$200M per annum. It currently operates a dated 16MB mainframe that runs financial accounting and related applications. The IS manager has recommended migration from the mainframe onto a midsize minicomputer *Unix*-based platform. The organisation is operationally dependent upon a number of complex, legacy accounting systems written in a 4GL, and that have been progressively refined over the years to suit the corporation's style of business. Recently the 4GL vendor has announced the availability of the *Unix* version of the 4GL with migration tools, thereby potentially easing the transition to the new hardware platform. In the process of deliberating the downsizing scenario, the considerations that have figured in the decision include vastly improved platform economics, the continued compatibility with a fairly large number of existing PCs, the option of rewriting the existing applications in a client-server architecture with user-friendly graphic interfaces, and the longer-term benefits of the move away from proprietary architecture towards a more open IT infrastructure.

Example #3 is a leader in the local warehousing and transportation industry. A year ago, it undertook a major IS planning exercise, as a result of which a decision was taken by senior management to develop its IT infrastructure based upon open standards. It subsequently replaced its old minicomputer with a new *Unix*-based mini, and purchased ORACLE-based accounting software to replace existing batch-oriented accounting systems. The new package provided for online file processing, and was subsequently enhanced to improve the customer handling aspects. An existing PC LAN was also linked into the new mini, to allow downloading of files and data

exchange. The migration exercise has resulted in more tightly integrated systems, ready access to online data, and reduced monthly running costs. The main benefits, however, of moving towards a more open environment will only materialise in the longer-term future. Switching to the new accounting software is pretty much transparent as far as the new operating environment is concerned. There have been benefits of online processing, and much is expected of the underlying RDBMS capability as users gain increased familiarity in future.

Example #4 is the world's leading international air courier company, which deliberately committed to a worldwide IT strategy based upon open systems in 1986. Reasons for the decision include scalability - the new systems being developed for the *Unix* environment will run on microcomputer, workstation, and various minicomputer platforms worldwide - a particularly significant factor for its fast-growing Asian offices; and connectivity - as a strong communications infrastructure for information transmission forms the backbone of the company's international business. The *Unix* decision provides for distributed, realtime processing across a centrally-managed X.25 net.

The organisation has gone through a significant learning curve with *Unix*, and the transition is now well advanced, including Singapore's which is the organisation's Asian office. Software migration strategy comprises the ongoing development of new strategic systems on the open platform, as well as the porting (also ongoing) over of existing critical operations, and implementing applications as they are developed or acquired, as in the case of packages.

The projected benefits of using new accounting software under the *Unix* environment include those of online processing (vs. the existing batch-oriented processing), integrated systems, higher productivity (using RDBMS-based software that can be linked to E-mail, spreadsheets, etc), user-friendliness, and improved management information availability.

FINDINGS

All the organisations surveyed currently operate, with the exception of one that is in the process of converting to, the current-generation accounting softwares in their new open *Unix* machine environments - new in the sense that none of the machines had been installed more than two years ago. In all cases, with one exception, the organisations had either outsourced the development of their software, or had purchased ready-made packages. The language of development in almost all instances was a RDBMS-based 4GL. All the four had significant IS departments given this class of machine (high-end/superminis), and staff strengths ranged from ten to eighteen for three of the installations, with the fourth - a large statutory board - having a central IS strength at least double the latter count. In terms of business sales turnover, these organisations fall in the

medium-to-large business category, i.e. S\$50M - 300M per annum; with the exception of the latter (statutory board) organisation which is entirely public service-oriented. All are conventionally structured organisation-wise, and although each is dominant in its industry, none is reputed for any particular innovation, and their collective management styles were probably more indicative of good, solid rather than innovative, management.

Summary of Results. In terms of computerisation impact, there have been in all instances benefit, or projected benefit, in migrating to accounting systems running in a *Unix* environment. The benefits are those of downsizing, of economics, of improved management information and control, of improved productivity, of enhanced connectivity and of more highly integrated systems in terms of data-, process-, and systems resource-sharing, and of improved user-friendliness.

The characteristics of such benefits as realised by these organisations are more in line with those that are associated with the traditional model of automation - i.e. conventional benefits - rather than with the order-of-magnitude-type benefits that have been associated with the BPR model and those cases documented in the literature (or with those associated with the new-generation manufacturing software). In terms of impact on organisation structure, as would be expected therefore, they have been limited mainly to impact at departmental level and to the individual worker.

This could be due to a number of factors, noticed in commonality in the four organisations surveyed, and these are drawn out in the rest of the section.

High Levels of Conventional Automation. One possible explanation is that in all cases the current-generation accounting software had merely been deployed to achieve a high level of automation of the traditional clerical processes in the organisations studied.

Absence of BPR-type Approach/Methodology. Benefits in terms of order-of-magnitude (10X) or of transformational-type change were not witnessed, unlike the case with the new-generation Manufacturing software. In none of the organisations has BPR methodology been adopted. Although all projects were supported by top management or at least by a steering committee, in project proposal studies no vision of an improved business organisation that drove the project was evident, and although interdisciplinary teams were involved in the study, and cross-functional system improvements planned, these were mostly at an operational level. Consequently only conventional benefits/returns, not significant (tenfold) improvement, had been targetted.

Comparison of these findings with the BPR benefits/issues model of two sections earlier indicate that both BPR-type tools as well as methodology need to be available in order to effect the kind of dramatic change that is associated with organisation transformation, consequently the mere deployment of even state-of-the-art *Unix* software will be unlikely to realise such change.

Awareness of the BPR concept amongst key IS personnel ranged from limited to well-informed; however wherever the latter was the case, the intention to pilot at least an IT-enabled BPR-type project in the near future was mentioned.

Cross-Functional and Interorganisational System Capability. In the study, none of the accounting systems studied (including order processing and receiving systems) crossed business functions and achieved improvements as spectacularly, nor do they have the ability to integrate into IS' that do. The packages that were employed were of the conventional accounting applications variety and without cross-functional capability. Also, unlike the cases in the literature, they possessed limited (EDI) or no IOS capability.

Unix-based Accounting Software. This is reflective of the still-limited functionality of some of the *Unix*-based Accounting software that is in use today. As pointed out earlier, a good part of the current-generation *Unix* accounting software comprises software that has been ported over, but with feature upgrades, from the era of proprietary mainframe/mini operating environments. Such software will boast the strengths of a mature and proven product - characteristics like stability, support, and comprehensive accounting capability. However they also retain many of the limitations of the earlier generation.

On the other hand a good number of *Unix*-based accounting software, especially the more recent packages, have been written to take advantage of the more open *Unix* platform - consequently they reflect 4GL heritages that are RDBMS-based, have on-line processing and query capability, display GUI-like frontends, and enjoy the superior performance and portability/interoperability advantages of being *Unix* platform-based.

However such capability, whilst impressive by traditional accounting software capabilities, pale beside those of the next generation of accounting systems.

New-generation accounting systems. The new generation of accounting systems, the "Accounting Systems of the 1990s", promise to make a more significant impact, going from reports in the literature. These software will likely be implemented, as their manufacturing cousins have been, within the concept of enterprise computing and in the context of business reengineering.

Will the new systems likely achieve the kind of transformation that we have witnessed in manufacturing? From a preview of the literature this certainly appears to be the kind of capabilities that the new generation software has been targetted at. This is borne out by the type of added functionality that have been built into these packages.

THE OPEN ACCOUNTING SYSTEM MODEL OF THE 1990s

The new-generation accounting systems will likely be open, capable of operating on a

number of platforms, client-server based, and operate within Enterprise Computing environments - most likely Unix-based - like their cousins in the manufacturing area.

Features to Look For. According to a Computerworld report [6], these future Accounting systems will sport GUIs, function within a client/server architecture, operate and interoperate effectively on a variety of platforms, possess BPR features for improving internal business processes, provide up-to-the-minute operational data, and support multiple accounting languages for global business operations. They are also likely to be online (and not batch-oriented as the current-generation systems are) be able to support distributed databases; and possess imaging capabilities.

BPR Feature. Of the new features previewed, potentially the most exciting is the BPR feature. BPR features, when they are delivered in the new-generation packages, will be a key way to help companies find new and better ways to perform accounting functions. Current-generation accounting packages as we already know, do not have the flexibility nor the architecture to permit users to do business process reengineering.

On the other hand such features are already to be found in the latest wave of manufacturing systems software. For instance one leading package features a generic enterprise MRP II model, or template that the customer uses to map onto his organisation's specific business processes. Following that, an I-CASE tool with integrated 4GL capability is used to custom-develop the specific processes that are found to be missing or different.

Data in Realtime. The experience with most of today's mainframe-based (and thus batched-processing oriented) accounting systems is that information may be weeks old by the time it gets into the hands of users. Managing in the 1990s calls for the use of up-to-the-minute accounting data as a means of running companies on a day-to-day basis. This means maintaining accounting records in realtime so that they are as current as the most recent entries on the system, and easy access to these data so that they may be fed into spreadsheets and processed, then communicated via E-mail to other executives, etc.

Other User Issues. Realtime processing capability aside, other issues likely to be addressed in the accounting systems of the future are the downsizing (or rightsizing) issue, migration issues, and issues relating to the assessing of the IT investment in the future, the vendors of the accounting systems of the future, and "Computer-aided Accounting".

Downsizing issues will continue to figure on IT agendas as managements insist on lower costs, and as users push for quicker and easier access to accounting data. More and more organisations will consider downsizing their accounting applications to open, microprocessor and LAN-based platforms. Moving such applications to such open environments will create opportunities to introduce new RDBMS-based technologies and

user-friendly GUI interfaces.

Migration issues - much has been written about the "painless road" to open systems, in the course of which numerous migration models have also been proposed. A key issue has been that of existing large IT investments tied up in legacy systems. In the manufacturing area, vendors of the new-generation software have offered existing users of their current-generation MRP II software alternative migration options to the new, more open systems. It might well be that new-generation accounting software vendors will also offer a similar migration service to their current-generation accounting system users.

The vendors of the accounting systems of the future - there are conflicting views as to whether the accounting systems of the 1990s already exist. Leading-edge vendors claim that such systems (theirs) are already on the market, whilst other experts say 1994 is the earliest likely date that full-fledged products will be delivered. Current-generation accounting systems have already been stretched as far as they will go in terms of upgrades, add-on features, enhancements, etc, so much so that to create the system of the future, large systems vendors will likely have a lot of revamping to do.. Industry watchers predict that what is likely eventually is that these future accounting systems will therefore not be delivered by the existing, large market leaders, but by their smaller, more nimble competitors.

"Computer-aided Accounting" is one accountant-user's term (Computerworld, February 24, 1992) for what amounts to new accounting "wishware" that provides a complete computer-assisted environment which supports and enhances the accounting knowledge worker's mental processes and workflow. A concept reminiscent of today's IT professional's CASE-based workbench - the "accountant's workbench", perhaps?

CONCLUSION

Whilst current-generation accounting software appear to have achieved only limited impact on the business enterprise in the context of today's open, Unix environment, the next-generation accounting software that are waiting in the wings promise to achieve greater impact, along the manufacturing vein, in concert with other factors, upon the business corporation of the 1990s.

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