



making new realities

presents

BUSINESS TRANSFORMATION
THROUGH OFFICE AUTOMATION?



www.newmind.com.au

new mind, 38A Robert Street, Como
WA 6152 Australia



info@newmind.com.au

SOST'91:

BUSINESS TRANSFORMATION THROUGH OFFICE AUTOMATION ?

**AN ANALYSIS OF THE BENEFITS OBTAINED FROM CHANGED WORK
PRACTICES, I.E. BUSINESS TRANSFORMATION AND OFFICE
AUTOMATION IN A NUMBER OF CASE STUDIES.**

Ingo M.M. Rheinbay
State Bank Of New South Wales

Abstract

Most of today's organisational structures are founded on separation and segmentation of thought and action, i.e. specialisation in narrow tasks. Increasingly, enterprises try to reduce disadvantages and cost associated with this paradigm. Office Automation (OA) technology is frequently applied to achieve this objective, which raises the question about the benefits of Office Automation.

This paper collates the experiences of a wide range of enterprises. The experiences are not limited to cost reduction and applications of Office Automation in administration, but include those related to management and business strategy.

An important side effect of the pursuit to reduce the above mentioned cost and disadvantages is a more holistic approach to office work. Fundamental changes in work practises observed in many of the cases studied, point to a probable need for proper research of this subject.

It is concluded, that the conventional notion of OA, i.e. the automation of clerical activities is insufficient to explain some of the very high benefits, and that the notion evolves to mean organizational transformation with the aid of Information Technology.

SCOPE OF OFFICE AUTOMATION

Observation of commercial offices makes apparent the main processes taking place in these offices, namely: document management, group work, decision making and transaction.

"Automation is the technique of converting a mechanical process to maximum automatic operation by the use of electronic control mechanisms" (Funk & Wagnall 1959). A digital dictionary defines computer automation as the replacement of manual operations by computerized methods which lead to the definition of Office automation as the integration of clerical tasks such as typing, filing and appointment scheduling.

Consequently, Office Automation (OA), in the context of IT, can be defined as: **The technique of converting Document Management, Group Work, Decision Making and Transaction Processing to maximum automatic operation by use of Information Technology.**

This is a functional view rather than a technological one. As can be seen from the descriptions below, technology, such as word processing, e-mail, work-flow and imaging systems, serves the function and is not an end in itself.

Document Management includes all phases of the life documents and similar communications, namely creation, refinement, distribution, receipt, archiving, retrieval and destruction.

Group Work Support includes task management (i.e. allocation, control and execution, reporting and resource management) for ad hoc and permanent work groups.

Decision Making Support Systems include the storage, retrieval, analysis, correlation and presentation of information from conventional and electronic, internal and external sources.

Transaction Processing is the execution of business activities in information industries (e.g. debiting a bank account) or the administration thereof in other industries (e.g. billing of goods).

This paper adopts a comprehensive view of Office Automation. Hence, transaction processing, inter-organisational communications are included, as are the functions in front and back offices, and

activities of secretaries, clerks, case workers, knowledge workers, managers and executives. End User Computing (EUC) is also considered part of OA.

COMMENT ON THE BENEFITS STATED IN THE CASE STUDIES

Each of the following chapters focuses on specific office processes and benefits obtained from automation. This should not be interpreted as blindly favouring 'technologism'; rather as illumination of potential benefits. Also, the common belief that investment in technology has an inherent high return, is not promoted.

Some of the information was obtained from parties with vested interests, such as consultants and vendors. This may explain the emphasis on technology, however the author firmly believes that the substantial benefits described in some cases were realised through **the combination of organisational changes and the application of information technology.**

BENEFITS OF AUTOMATED DOCUMENT MANAGEMENT

KLM Royal Dutch Airlines' Outsourcing of IT Management Operation

KLM Royal Dutch Airlines is an international airline that transports nearly 22 million passengers and 620,000 tons of cargo to more than 250 destinations worldwide every year merged with Air France in 2004 to form the largest airline group in the world by operating revenues. In 2000, it signed an automation agreement with Fujitsu in pursuit of standardizing and outsourcing its office automation operations across the organization. This resulted to lower costs and fewer interruptions in the workplace. Office Automation made KLM's desktop environment much more structured and efficient and beneficial for the whole company.

<http://www.fujitsu.com/downloads/SVC/fs/casestudies/klm.pdf>

Aliant and Fuji Xerox

Aliant's Consumer Marketing Director Claudine Langan said, "We received feedback from our customers that our bill was confusing, not customer friendly. We realized it was time to make a big change."

Aliant is one of North America's leading regional providers of information and communications technology that sends monthly bills to hundreds of thousands of customers in the four maritime provinces of Atlantic Canada. Their monthly billings that have inconsistent bill format confuse their customers which resulted to increased Customer Care Center calls and it interfered with their cash flow.

Aliant then worked with Fuji Xerox where their communication engineers re-designed the billing format to improve customer experience which at the same time facilitated their marketing efforts. Outsourcing such task to Fuji Xerox optimized Aliant's print production which then reduced their cost and made things a lot more efficient. The Lean Six Sigma principle that was used in the improvements expedited a complex transaction that involves technology, staff and sensitive customer data.

http://www.xerox.com/downloads/world/x/XGS_CS_Aliant_en.pdf

Managing Complexity at Reuters

Reuters is the world's largest international multimedia news agency employing 2,400 editorial staff, journalists and photographers in 196 bureaux with a total of 16,900 staff in 94 countries. It is an enterprise that provides vital information to around 370,000 professionals in the financial services arena, and the media and corporate markets. It maintains more than 200 million data records containing more than 3,000 billion discrete data point. Its annual revenue is about £2.6 billion.

With its operations that run from 1851 to present, the Reuters had gradually accumulated a large, mixed fleet of printers, multifunction devices, copiers and faxes that totaled to a fleet of 1,046 printers, copiers and multifunction devices, comprised of 242 different models from 27 suppliers.

These have been acquired by departments and individual workgroups when a need arose, without following any clearly defined strategy. It came to a point where there had been a whole mismatch of equipment of different models that are leased or owned and spread throughout multiple offices at multiple sites.

The company was producing 16.5 million 'impressions' per year, equating to around 420 pages per head, per month. With this, Reuters made Xerox introduced a fully managed service that took complete responsibility for its entire document output environment where inefficient, expensive devices were removed and an optimised fleet of appropriately located, best-for-purpose machines - which included existing equipment, where practicable - was created.

An on-site help desk was then introduced. It links the company's incumbent IT service provider, and an 8-strong team was appointed to take care of service provision and the procurement of all consumables, paper and printers. A print room was also established to take care of large and specialised jobs at Reuters. This solution resulted to an obvious gains in user satisfaction and productivity and that the new managed service has delivered significant and substantial savings of \$1.45 million over the life of the 5-year contract with Xerox.

http://www.xerox.com/downloads/usa/en/xgs/casestudies/xgs_casestudy_Reuters.pdf

Workflow Management System at Chemical Bank

To reduce time and manpower required by the mainframe based Accounts Payable system, Chemical Bank chose a workflow system. The bank achieved reduction of manpower by 63% (i.e. staff number reduced from 30 to 19 plus elimination of 300 hours overtime per week), improved service through reduction of cases outstanding more than one week from 200 to zero and reduction of time to pay from 60 days to seven days (Computron Technologies 1991).

No More Routine Orders In Purchasing Department

Westinghouse redesigned the procurement process of Portland General Electric. Initially PGE wanted an electronic link to exchange trading data, i.e. EDI. Westinghouse estimated a 10% efficiency yield. Instead, **the procurement process was redesigned** to by-pass the purchasing department for most routine orders. This and EDI reduced in one instance the order cost by a factor of nine and turn-around time from 15 days to half a day (Butler Cox Foundation 1991).

One Paper Battle Won at USAA

USAA, the American insurance company, processes 27 million pieces of incoming mail and 21 million phone calls per year. This required huge and labour intensive facilities for receiving, handling, distributing, processing, storing and retrieving of paper based documents. With an image system, improvements in quality and reduction of cost were achieved. Service turn-around time is reduced from days to minutes, as no delays are incurred to retrieve paper based records. The impression is given that the system also enabled telephone case work. Also improved is control by management

over case work, e.g. priority and age, workload and performance. Savings achieved are \$US 4m through reallocation of office space and personnel who previously handled paper (IBM 1991).

Case Work at Citibank South Dakota

This part of Citibank manages 17 million credit card accounts for which it receives approximately four million pieces of correspondence per year. A prototype of ImagePlus was developed and put into production in 1988. Today 14,000 pages of correspondence are scanned and indexed daily, at a rate of 200 pages per hour per operator. Imaging is integrated with customer accounting on the mainframe. Case worker productivity has increased by more than 20%, i.e. from 10.5 cases/hour to 12.6 cases/hour. Savings quoted are 5,000 sq feet of office space (IBM 1991).

Putnam Is Aiming To Be The Best In The Industry

Putnam provides investment management services to 2 million investors processing of 35-40,000 pieces paper per day. An imaging system in the shareholder service department supports 6,500 to 7,000 transactions weekly. Planning and organising this would normally require two staff, but now this seems to be done by supervisors in addition to their other work. Since November 1989 this department experienced a minimum of 30% productivity improvement and expects to increase this in the next 18 months (IBM 1991).

400% Efficiency Improvement In Accounts Payable Department

Ford employed 500 people in its accounts payable department. Management thought it could reduce the headcount to 400 with rationalised procedures and new computer systems. Mazda did the same work with fewer than 100 people. Research showed that **Mazda had redesigned**, where Ford wanted to streamline. When Ford redesigned the payment process, it eliminated the Accounts Payable department: In effect goods-inwards staff released payment - without waiting for and processing suppliers' invoices. As a result Ford achieved 75% reduction in headcount, not just 20% as originally planned (Butler Cox Foundation 1991).

Glaxo's Worldwide Word-Processing Against Bureaucracies

Glaxo developed and implemented a strategy to integrate world-wide its word-processing systems. This was aimed particularly at the research and development (R&D) departments which manage the paper intensive applications for approval of drugs by national authorities. Filing/retrieval and intra-company exchange of information and documents were identified as two main problem areas. After

world-wide integration of word-processing, Glaxo became capable of bringing new drugs to the market three months earlier than previously (Daley 1991).

Hawaiian Bank uses Lunchtime Opportunities

Market research by a bank in Honolulu, Hawaii USA, showed that approximately 80% of all mortgage and commercial loans applications would be accepted by almost every bank. The Bank argued that processing and approval of mortgage applications in ten minutes - for example during customers' lunch time - would result in a bigger portion of the 80% share and would enable the bank to focus on the remaining 20%. A project for an imaging system integrated with all existing customer databases of the bank has been initiated (Daley 1991)

Missed Opportunities at University of Southern California

A few years ago, this university noticed a reduction in the number of new student enrolments. A thorough analysis showed that the University was in fact receiving a growing number of applications but they did not result in a proportional number of enrolments. The reason was the long time, 17 days, taken by the University of Southern California to respond to applications. Students, not wanting to miss a place, enrolled in other universities which had responded more quickly. Processing time for student applications has been reduced to four days and enrolments have increased drastically. In addition, a productivity increase of 75% in the processing of applications was achieved (Daley 1991).

At Glaxo, Employees Do Different Work

At Glaxo Inc., Research Triangle Park, NC some employees spent six hours (scientists), five hours (managers) or one hour (executives) every day searching, retrieving and using paper based information. An image based system provides a database for the information generated during R&D activities, providing improved access and reducing storage requirements. It is projected to save \$US1.7 million in construction cost and \$US2.1 million in personnel cost between 1989 and 1991. (IBM 1990)

Bergen Brunswig Builds Ties To Customers and Suppliers

Bergen Brunswig is a \$US35 billion drug company in Orange, California. Their experience is exemplary for the benefits resulting from EDI. For example Bergen Brunswig found that, once it began receiving EDI invoices, it could redirect 70 employees from data entry to resolving purchasing discrepancies. It also reduced lost discounts and helped negotiate better invoice pricing. EDI will also strengthen ties between the company and its customers (Slavin 1990).

Improved Service And Reduced Cost At ATP Denmark

ATP Denmark, an institution with 500 employees, provides The Labour Market Supplementary Pension. ATP uses a comprehensive system for case workers with management/supervisor functionality to handle non-routine cases and assist in the overall control of the work. Extremely high attention was paid to user interface, work environment and training. Between 1975 and 1986 the workload has approximately doubled but the cost was reduced by approx. 15% in real terms. Waiting time for incoming phone calls is on average two seconds (Hansen 1988).

BENEFITS OF WORK GROUP SUPPORT**Work Group at Richard D. Irwin, Inc. (Textbook Publisher)**

Richard D. Irwin a leading US college textbook publisher has installed a LAN to aid editorial assistants in coordinating manuscript writing and reviewing. The time for this is reduced from a week to a few hours. The system also appears to give a competitive advantage when competing for manuscripts: Prospective authors have been impressed with the high quality of proposals and more often sign up with Irwin (IS Analyzer 1989).

More With Less at Mutual Benefit Life (MBL)

MBL has introduced sweeping changes in the processing of applications for insurance policies. Sequential processing spanning five departments has been replaced by 'Case Managers'. The MBL can handle more than twice the application volume and has eliminated 100 field-office positions. (Butler Cox Foundation 1991)

Staff Number 50% Below Industry Norm

Batterymarch, an investment-management firm specialises in contrarian investment. Its conventional competitors are usually organised around five functions. Batterymarch has used information technology to help restructure its business around three so-called strategic processes. As a result Batterymarch employs - relative to its asset base of \$US12 billion and industry - only 50% as many professional staff and 20% as many support staff (Butler Cox Foundation 1991).

The Electronic Meeting System (EMS) At IBM

Managers spend between 35% and 70% of their time in meetings. One IBM facility was able to reduce the total man hours in meetings by 61% through the use of an Electronic Meeting System (EMS, sometimes called a Decision Room). This is a purpose built facility, i.e. meeting room, with

group support software and hardware. IBM has established 33 EMS facilities. The payback period for the investment is estimated to be less than one year(MIS Quarterly 1990).

Group Decision Support Systems(GDSS)

Electronic Meeting Systems are currently seen as the most beneficial type of GDSS and most research has been directed to these systems. This is probably due to the broader application of EMS, viz. communication as opposed to the more narrowly focussed decision support for GDSS. Other types of GDSS are also Local Area Decision Net (LADN) and Computer Conferencing.

Five independent studies between 1984 and 1989 have reported high satisfaction with the process and/or the decision and high levels of effectiveness. In fact two studies report time savings of 75% and 61%, respectively (Alan, et al 1988).

Comparing GDSS, i.e. Decision Rooms (EMS), with no computer support, best case - worst case conclusions have been drawn(Dennis et al):

Best:

Associated with better quality decisions.

Even levels of participation.

Worst:

No difference in quality of decision.

No differences in participation.

BENEFITS OF DECISION SUPPORT SYSTEMS

Knowledge Worker and Decision Support at Chemical Bank

This Bank's World-wide Consumer Banking Group (WCBG) provides limited private banking services to 17,000 customers in several countries. Maintenance of records at branch level in many countries led to confusion. A workflow system is the basis for these improvements: Each representative can handle 2,000 complete accounts, faster service through same-day correspondence, improved management of workload and performance, destruction of paper documents after recording their image, integration with traditional applications and improved decision support for management. The Bank was able - within minutes - to locate the accounts of all customers in Iraq. According to the VP of WCBG, because of the integration of several diverse technologies, "the system will change everyone's job description" (Image Systems 1990)

Business Intelligence Through IT at Lincoln National Corporation

Lincoln National Corporation is a \$US23 billion insurance and financial services firm. It uses a corporate wide information retrieval and communications system to collect and disseminate business intelligence, i.e. text based information to 5,000 key employees. A text retrieval and correlation package assists with short term information (the day's news from external sources, such as NY Times and BusinessWeek) and long term information (retention of internal mail, reports, research papers, even anecdotal information and external sources). Benefits are: Better communication of information, eliminating the need to pre-brief attendees of meetings and enabling meetings to get to the pertinent points more quickly. Executives are much better informed and can improve their "mental model" of their company and the industry (IS Analyzer 1990).

A Case of and for Business Intelligence at Asea Brown Boveri (ABB)

ABB, the \$US20 billion Swiss/Swedish electrotechnical conglomerate, in 1989 acquired Combustion Engineering (CE), a multi billion dollar power and process control plant builder of Stamford, CT. During acquisition and evaluation, ABB depended heavily on competitive intelligence, gathered by a single senior staff member from sources such as competitors, professional associations, government agencies, newspapers, brokers and investment analysts. Electronic information sources, e.g. NEXIS, Dow Jones, and Investext were tapped with a PC. During only six weeks ABB collected over 1,000 pages of documentation on CE, without arousing suspicion. ABB found that off-the-shelf OA technology, i.e. PC, communications and word processing software, plus concealed collection of readily available information saved potentially millions of dollars that challenges and counter offers might have cost (IS Analyzer 1990).

OA BENEFITS IN GENERAL

Productivity Improvements in General

Productivity increase over conventional task execution has been stated as:

spreadsheets	60%	document distribution	90%
graphics	50%	administration/filing	50%
word processing	30%		

These figures from a Swiss University may be culturally biased. However, in the original article word processing is limited to capturing of text, whereas distribution is a separate function with a productivity increase three times as high (Becker 1990).

Integrated Office Automation Extends Corporate Reach

A study conducted by Arthur Young, New York, estimated that clerical costs can be reduced by 10% through eliminating manual data conversion activities, e.g. re-keying and integrating files. Users found that an All-in-One integrated text information management system can reduce the time for document searches from days to minutes, which has saved some companies as much as \$1,042 per search (assuming an average salary of \$25,000 p.a.) (Slavin 1990).

Cost Savings Through Electronic Data Interchange

Examples of cost savings with EDI are :

- Hewlett-Packard saved \$180 million per annum,
- DEC reduced inventory in one plant from \$1.8 million to \$0.45 million,
- IBM obtained 7% cost savings from suppliers in its Bordeaux plant,
- Douglas Aircraft reduced the cost of a spare parts order from \$9.00 to \$1.80,
- General Motors plans to reduce production cost of every vehicle by \$US200,
- RCA estimates to reduce cost \$US50 to \$US4 per complete order (Schuman 1990).

Do The Real Users Benefit ?

For a study of "The strategic impact of information technology on managerial work" some 900 middle managers in eight large US corporations were asked about the information technology they used, including telephone, traditional internal communications, outwards paper-based communication, voice messaging, electronic conferencing and computer technology (I/S Analyzer 1987).

Of the respondents, 35% classified themselves as middle managers, 10% as professionals and 55% as both. The professionals felt they were best served by computer technology that helped **processing** information, e.g. analysing, storing, transforming and evaluating. The others, i.e. managers and manager/professionals felt they were best served by technology that helps **using** information, e.g. communication and taking action.

Managers were less satisfied than professionals. They see computer technology as less helpful than the other technologies (i.e. telephone, traditional communication, voice messaging and electronic conferencing), whereas computer technology is the most helpful technology for the professionals.

The preceding sections enumerate direct and tangible benefits. The following two sections relate analyses of indirect and intangible benefits of OA. The view is increasingly gaining momentum, that quality, i.e. effectiveness, resulting from information work is more important than efficiency, i.e.

quantity, and some examples supporting this view are given. Some analyses of lost opportunities, sometimes with associated cost, are reported the section thereafter.

INTANGIBLE (INDIRECT) BENEFITS

The Electronic Meeting System

The EMS improves meeting productivity and quality. For example it prevents "burnout" of group members, gives quick turn-around of results, inter-group differences are resolved more easily and quickly than in traditional groups (MIS Quarterly 1990). GDSS users repeatedly report better quality of decisions and a more satisfactory process of decision reaching (Dennis et al).

Memo Wars and Real Action

Electronic mail had some unexpected benefits: (1) It reduces memo wars by people who are unsure of their political position in the company, and used memos to shift blame. Now, with e-mail people deal directly with each other, not through intermediaries. (2) Electronic communications often encourages real action, because they convey more real information (Price Waterhouse 1987).

Direct Vs Indirect Benefits of Information Management

Daley, concludes that the indirect cost and benefit outweigh the direct ones by a factor between three and five. He defines the direct cost as that mainly incurred in the IT/MIS/EDP department, but includes such items as equipment cost throughout the organisation. The indirect cost is the cost incurred in the use of IT and OA. Daley calls this 'sloppiness cost', i.e. the cost caused by bad or even wrong information, loss of information and other wasteful practices (Daley 1991).

DOES OA AFFECT COMPETITION IN THE MARKET ?

This section attempts to illustrate some of opportunities and threats inherent in some benefits of OA. For example, the ability to tie suppliers or customers more strongly to an enterprise or erecting competitive barriers. These ties and barriers are not based on the trade of goods and services, but on secondary items, such as electronic ordering and billing.

Electronic Data Interchange (EDI)

EDI is increasingly often referred to in the OA context. This may be because EDI addresses OA issues: The paper flood, effectiveness and efficiency of communication, control over transactions and chains thereof and removing repetitive tasks. Fully integrated into the business processes, EDI's benefits to customer service can be impressive. For example, shorter lead times for customer orders, plus reduced inventory and just-in-time delivery system (Slavin 1990) Although the technical aspects of EDI are fairly straightforward, the organisational ramifications are complex. EDI changes the way of doing business -- both internally and externally -- bringing an organisation's employees, vendors and customers into closer relationships than ever before (Slavin 1990)

EDI Affects Competitive Position

A study of "Potential Benefits Of Inter Company Information Processing" confirms that OA has indeed an effect on the competitive position of the players in a market. The first two of the three major characteristics of EDI applications can cause this change:

- (1) Other parties in the market are either barred from access to information or conversely given access to additional information;
- (2) they have a stronger impact on market forces and competition than similar intra-company applications; and
- (3) trans-company communications facilities are a prerequisite. These are often provided by third parties (Schuman 1990).

Electronic Meeting System for Better Decisions

The EMS reduced the calendar time required to complete a project by an average 92%(MIS Quarterly 1990). In addition to the savings in man hours, the good and swiftly reached decision will give the enterprise a substantial competitive advantage.

Office Automation Preferred by Office Workers.

For service industries, a potentially vicious circle is hiding: An enterprise using outdated information technology, including OA, may not be able to attract the capable staff it needs, and therefore may become less competitive, which in turn deprives the enterprise of the funds to invest in IT. For example: Who wants to perform routine tasks, when case work, without routine tasks is available, and who wants to jeopardise his/her career by using and learning non-marketable skills ?

EXPECTATIONS, ESTIMATES AND FUTURE PROJECTS

In some cases benefits have not yet been measured and only expectations and estimates are available. Other, substantial projects are in their early stages. However, expectations and projections are of such magnitude that a brief description is warranted.

\$US150 million to combine EDP, OA and PC

American Airlines' InterAAct is a project to combine data processing, office automation, personal computing and networking. The cost for 70,000 employees is estimated to be \$US150 million, i.e. over \$US2,000 per employee. Management and clerical workers are expected to increase productivity by 7% plus 2% through more timely and accurate access to the company's data (Datamation 1990).

40,000 Employees put on e-mail

Co-ordination Technologies the very large and fiercely competitive Fortune 25 firm has spent ten years systematically putting 40,000 employees on its proprietary e-mail system, which cost \$US20 million. IT managers of the company estimate that e-mail cut the time-cost of meetings at the managerial level by over 40% (Satish Jha 1990).

10,000 Copies Of Groupware Software Purchased

Price Waterhouse (PW), New York has purchased 10,000 copies of Lotus' Notes which are expected to be deployed over two years. PW wanted everyone to be broadcaster and recipient of communications without creating confusion and information flooding.

Iowa Department of Transportation

This authority manages the files of 100,000 problem drivers. Currently the following problems have been identified: file space, simultaneous access and integrity e.g. lost files, management of workload. Daily volumes are: 2500 new documents, 3600 folders accessed, 175 new folders, 110,000 existing folders. The department employs "18 people to manage this flood of paper". A pilot project with IBM has been instigated to install an image technology based system which addresses the above problems (IBM 1991).

Automobile Club of Southern California

This club with 3.5 million members in 80 district offices provides various insurances besides the traditional road service and car owner advice. On a typical day 140 people file 33,000 documents in storage taking up 56,000 sq feet office space.

Major benefits expected from a new imaging system include better service, faster response, faster processing of transactions and reduced cost. It is planned to have the system fully implemented in 1993 which would lead to annual savings of \$US2 million (IBM 1991).

COST OF OFFICE AUTOMATION

The Shift Within The IS Budget

Many researchers and consultants predict two shifts in the cost of information systems: Firstly, a growing share of the total corporate IS budget will be consumed by OA as opposed to the automation of clerical tasks by way of transaction processing. Secondly, hardware plus software employed for OA will be less than 30% of direct investment in PCs whereas support for OA will make up more than 50% of the direct cost. (Nolan, Norton & Co.) One of the reasons for these shifts is cost: 1990 the ratio technology cost to labour cost is 1:10, whereas 1970 it was 1:1 (Strassman 1985).

Technology (Hardware and Software) Cost

Nolan, Norton & Co. and Strassman quote the annual cost for the technology applied to OA as approximately \$US5,000 per workstation. (Nolan, Norton & Co, and Strassman 1985). The two studies were conducted independently of each other, in different years and with different sources and methods.

Support and Infrastructure Cost

Direct cost items can be defined, enumerated and quantified, e.g. furniture, cables, data access, formal training, proportional share of corporate support services, etc. Nolan, Norton & Co. believes this to be additional \$US8,000(Nolan, Norton & Co.) and Paul Strassmann comes to a similar figure, i.e. \$US5,000 in 1980 dollars(Strassman 1985).

Indirect cost may possibly exceed this: Nolan, Norton & Co. project support and other cost at \$US4,450 per annum. Thus the measurable cost for a OA/EUC workstation is \$US15,000 to \$US18,000 pa. Based on incomplete data and some reasonable assumptions, it is estimated that Australian enterprises spend 50% of the \$US10,000 to \$US13,000 pa (i.e. the sum of \$US5000 for technology plus \$US5000 to \$US8000 for support and infrastructure).

The study does not include or analyse costs for corporate data stores and associated items. More importantly, the cost associated with Business Transformation (which, according to the study, yields a ten-fold return on investment) is not assessed. (Nolan, Norton & Co.)

CHALLENGES TO REALISE THE BENEFITS

Potential benefits offered by OA can be severely reduced if non-IT aspects are neglected. OA poses challenges which have to be met to convert the potential to reality. The nature of most of these issues is 'soft', but crucial for the realisation of the benefits.

The Need To Consider Environment And Attitudes

Bair asserts that companies are making a major blunder by stressing technology and ignoring the needs of employees in the design of their systems. He suggests the redesign of office methods and procedures to gain efficiency and effectiveness from new technology (Bair 1985). Research shows that non-IT aspects are critical for the success of OA implementations: "Outcomes such as increased productivity are unlikely to occur if new users do not have positive expectations and attitudes." (Hiltz 1988).

Increased control facilities inherent in OA systems are likely to cause concern and could impact negatively the positive expectations. In fact they could lead to unrest in the work force.

Demands on Management

OA projects which emphasize effectiveness require different criteria for measurement from those that focus on narrow issues such as labour savings. Many benefits of effectiveness are labelled 'intangible' or unmeasurable. The reason is the constrained realm of classical cost benefit analyses: It considers only direct, causal effects, not those several steps removed from the cause or where the effect is a non-event. Two examples illustrate this:

(1) The cost for correcting mistakes is enormous, yet often overlooked because it is in the unspecified future: Staff cost for 1,000 average employees spending 5% of their time correcting mistakes, is \$1.5 million pa. Operating cost is probably twice that amount;

(2) non-events are not considered as they cannot be a basis for discussion. Usual argumentation is linear and causal, e.g. improving the performance of existing work in a department. The non-event would be not to generate certain work for this department.

The challenge is to recognise the constraints of classical cost benefit analyses and relax them. The success of the whole organization may be a better benchmark than isolated OA projects.

Management Of Human Resources

(1) The Office Workers

Separation and segmentation of thought and action are traditional work practices. This approach is hostile to improvement and change, but requires less training. OA promotes a holistic approach and reduces separation and segmentation. Therefore, the user has to be better trained in Business, the use of technology and systems need improved useability.

(a) Training in business aspects: Where work becomes broader in scope, as applies to case workers, more understanding and ability will be needed. Training may be required to understand consequences of complex actions. This is opposed to traditional specialisation, where it is often acceptable to be ignorant of aspects outside the individual's narrow segment of activity.

(b) Training in the use of technology: The understanding of the technology's ability has to be deeper than in a narrow, single task environment. The understanding of causes enables office workers to direct OA systems to produce the desired results.

(c) Better useability: Traditional application design is biased to accommodate limitations of requirement specifications and technology. Useability and Human Factors, which have a much stronger impact on the 'cost of use' are typically not considered. OA systems support many tasks, and have to be designed according to Useability and Human Factors guide-lines. Paynter calculates that for 1,000 users, using two medium sized applications during half of their working time, the cost of bad useability is \$270,000 pa. Paynter adds: "A Human factored system is expected to reduce [this] training time by 25%." (Paynter 1990)

(2) The Managers

Training will not only be required for office workers, but also for their managers. ATP has recognised that large parts of the managers' old role have been taken over by the worker and the OA systems. Consequently ATP developed internal training courses for managers to be able to fulfil their new role.

"Managers should focus their attention on motivating their staff"

The managers should also be able to analyze manual systems and procedures and suggest changes to the organisation in order to realise the full benefits of the new systems (Hansen 1988) .

Some managers may argue that increased time for training may lead to time constraints regarding change and growth, and reductions of the work force may become expensive because of previous investments in the form of training, infrastructure and equipment. Such an argument shows difficulty in managing a new and more complex situation. The argument should be countered with the acquisition of management ability, i.e. training for managers.

Executives and Senior Management

"Corporations will shift their emphasis from financial capital to human capital, because human resources are the true competitive edge of a company." (Nesbitt & Arbudene 1987).

"Middle management numbers can be reduced because technology, not people, can collect, process, and pass information around the firm. Therefore corporations could lose many talented employees unless they invent alternative work structures." (IS Analyzer 1987)

These forecasts demand attention of the high management levels, to prevent damage to the enterprise. Such preventative measures should be part of the strategy to realise the benefits of OA and business transformation.

CONCLUSION

Is Office Automation A Misnomer ?

'Office Automation' may have connotations of back-office or administration, but the cases discussed in this paper show OA belongs to every part of the organisation, including the front-office to improve dealings with external stakeholders, e.g. customers and suppliers. Another connotation of OA is narrow tasks, e.g. word-processing and spreadsheets, but what is meant by OA includes all functions related to information management.

Technology In The Service Of Business Transformation

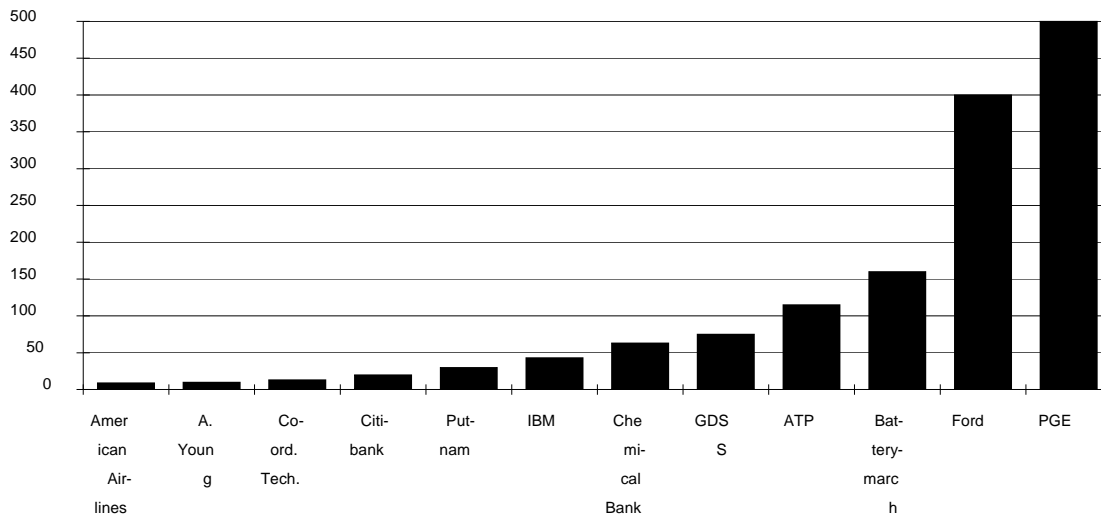
The most frequently encountered new practice applies a holistic approach to business transactions. For example selling, delivering, billing, accounting, after sales service form a single business process. In a transformed enterprise, all these tasks are often controlled and performed by a single

person, often called a case worker. This answers the question of the role of OA: OA enables business transformation and in many cases supports and promotes it.

Benefits From Changed Work Practices

Changed Work Practices are fundamental to enterprises and employees. It is an area where enormous improvements and benefits can be realised. An analysis of the gains reported in this paper manifests a relationship between the magnitude of the efficiency gains and presence or absence of changed work practice each case.

Percent Efficiency Gains Through Changed Work Practices and Office Automation



Improving efficiency and effectiveness of the work force by a factor of 2.0 to 5.0 appears possible with well managed change of work practices. Application of technology without changed practices appears to limit the improvement factor to 0.5 to 2.0.

Changed work practices will lead to transformed enterprises which will work differently:

- "OA allows management to turn administrators into business people, by making them more accountable for achieving results."(IS Analyzer 1987)

- Decision making is shifted from the back-office to the front-line through the sheer availability of information. This impacts on management structure, responsibilities and numbers. It also requires familiarity with decision making.
- Generalists with better business understanding through training, such as account managers and case workers, will impact on the product scope. New and related products and services can be introduced into a fertile and receptive environment.
- "OA supports tracking the welfare of the business. Consequently company management is moving toward a profit orientation and away from an administrative one." (IS Analyzer 1987)

A Recipe For Success

Where

- OA technology is applied to transform an organisation,
- Where changed work practices, not technology, are the major contributor to the transformation,
- where leveraging of the work force is understood,
- where the work force is managed to change work practices,
- where the business owns the transformation and OA strategies,
- where OA encompasses all related office functions,
- where it is a set of integrated functions,
- where the office is the front-line of the business, there the benefits are highest.

ACKNOWLEDGEMENTS

Andrew Tewes, Nani Narayanan (CIT, SBN) and the SOST'91 reviewer have added much clarity into this document and provided valuable advise. Mike Martin (CIT SBN) has provided a thought provoking critique of the draft. All mistakes are the author's alone.

REFERENCES

- Alan R.Dennis, Joey F. George, Len M. Jessup, Jay F. Nunamaker, Douglas R. Vogel,
Information Technology to Support Electronic Meetings in MIS Quarterly,
Vol 4, number 4, December 1988.
- Bair James,
Quoted in EDP Analyzer, February 1985.
- Becker, Dr. M.
Strategien und Kosten-/Nutzenaspekte, head of information technology
consulting of the BWI foundation at the Federal Institute of Technology,
Zurich, published in Output, 9403 Goldach, Nr6/1990.
- Butler Cox Foundation,
The Role of Information Technology in Transforming the Business,
Research Report 79, January 1991
- Computron Technologies,
Customer Profile of Chemical Bank 1991
- Daley John E.
Interview 1991.
- Datamation,
January 15, 1990, "The white-collar productivity push"
- Funk & Wagnalls
Standard Dictionary of the English Language.
- Hansen Knud Berg,
Information Technology at ATP Denmark, Improved Service and
Reduced Cost, in Information Technology for Organisational Systems,
H.J. Bullinger et al. (Editors), Elsevier Science Publishers B.V. (North
Holland) 1988
- Hiltz Starr Roxanne
Productivity Enhancement from Computer-mediated
Communication: A Systems Contingency Approach, in
Communications of the ACM, December 1988,
- IBM
Video tapes relating to Imaging / OfficeVision 1990/91.
- Image Systems,
Chemical Bank Manages World-wide Accounts with EIM, article in issue
#3 December 1990.
- I/S Analyzer,
May 1990, Vol.28, No 5.
- I/S Analyzer,
January 1989, Vol. 27, No 1

I/S Analyzer, December 1987, Vol. 25, No12, includes "The strategic impact of information technology on managerial work: Final Report", USC 1986.
IS Analyzer, Report "Price Waterhouse IT Review, 1987/88", quoted.
Jha Satish, Groupware - the next stage of computing ?, Article in Australian Communications / LAN Strategies / November 1990
MIS Quarterly, December 1990, Volume 14, number 4, pp369.

Nesbitt John and Aburdene Patricia

Re-Inventing the Corporation, quoted in (IS Analyzer 1987)

Nolan Norton & Co., Managing Personal Computers in the Large Organization, a report prepared for Lotus Development Corporation

Paynter, MaryAnn Cost Benefits Associated with Human Factors, SBN 1990

Slavin Lois, Digital Review April 30 1990, v7 n17

Schumann Matthias, Wirtschaftsinformatik, 1990, University Erlangen-Nurnberg, Germany.

Strassman, P.A., Information Payoff: The Transformation Of Work In The Electronic Age, The Free Press, 1985, Quoted In EDP Analyzer, February 1985

<http://www.yourdictionary.com/computer/automation>

<http://www.fujitsu.com/downloads/SVC/fs/casestudies/klm.pdf>

http://www.xerox.com/downloads/usa/en/xgs/casestudies/xgs_casestudy_Reuters.pdf

http://www.xerox.com/downloads/world/x/XGS_CS_Aliant_en.pdf