

New Opportunities from Globalisation

Exploiting Information Technologies for Electronic Commerce and Better Public Sector Management¹

Robert Schware² and Paul Kimberley

Summary

According to one school of thought, the technology gap between small and large nations will get wider and can never be reduced. This perspective argues that past expenditures on technology have created a permanent lead for some countries, an advantage that can only increase as economic differences become more pronounced.

There is another school of thought that argues that the advances created by technologies in the past have so reduced the costs of current technologies that anyone, large or small, can benefit. Small companies – even individuals – can be as efficient and responsive as larger companies by using the Internet and personal computers, even though the giant corporations may have spent billions on information technology. The same is true of small states, cities and small communities, no matter how remote. The technologies of efficiency – information technology (IT) and electronic commerce (EC) – are now available to all. The cost of technology is no longer the main constraint preventing its adoption. Hence we are seeing small enterprises, cities and some small states competing effectively with their much larger and richer erstwhile competitors. In a globalised, technology-based trading system, competitors can now also become collaborators, suppliers and customers. The rules are changing. How can small states take advantage of this situation?

Even though the economic barriers to adoption of IT and EC are falling, there are still some significant hurdles to overcome, at least in perception. Take the costs of telecommunications, for example. EC is dependent on telecommunications since it allows computers to communicate across

¹This paper was prepared for the Commonwealth Secretariat/World Bank Joint Task Force on Small States conference held in London in February 2000.

²Robert Schware is a Senior Informatics Specialist in the Telecommunications and Informatics Unit of the World Bank. Paul Kimberley is the Principal Consultant of PKA, a specialist Electronic Commerce consulting firm, based in Sydney, covering the Asia Pacific and developing country markets.

global or local networks. But the traditional costs of telecommunications cause concern among strategists – especially those representing monopoly or highly-regulated operators. The fact is that EC does not rely solely on land-line-based telecommunications. And even where it does, the return-on-investment calculation has changed forever, making it so much easier to justify new capacity. In many economies, Internet and data network usage surpassed voice usage of telecommunications networks during 1997–99, leaving the latter to increasingly lag behind as EC becomes ever more widely adopted. EC uses standard voice-grade, dial-up communications at the same time as they are used for traditional voice. But EC is much less demanding on the technology, and makes much more productive and revenue-earning use of it. Newer technologies such as Very Small Aperture Terminals (VSAT), cable TV, wireless and radio are all capable of carrying EC traffic. Even electric power utilities are now offering Internet access.

Moreover, new co-operative forms of procurement and management are making the justification of adopting EC methods even easier. For example, St. Lucia, Grenada, St. Vincent and the Grenadines, and St. Kitts and Nevis, backed by the Eastern Caribbean Telecommunications Authority, a regional regulatory body, have embarked on a radical programme of liberalisation. This co-operative initiative is enabling greater purchasing power, cheaper calls and liberalisation – without placing government revenues at risk.

The availability of local skills and the adequacy of resources are crucial factors. A range of options, including conventional aid, expatriate assistance, joint ventures with vendors on a risk-reward arrangement, can overcome any existing short-term deficiencies. There is no longer a critical shortage of skills – it is now a matter of applying available skills to states and entities which have the greatest needs.

Another key issue highlighted in this report concerns planning. There is no panacea for success in any enterprise, although it is remarkable how the best prepared always seem to be the luckiest. In Charles Darwin's frequently quoted words: 'It is not the strongest species that survive, nor the most intelligent, but the ones most responsive to change'. Adaptation is key to survival and to responding beneficially to opportunities. And the key to adaptation is preparedness. Success does not happen by accident in most cases. It requires research, planning, training, education, decision-making and well-managed implementation. Much of this report concerns this planning process since it is ultimately more important than cheap technology, aid or any amount of goodwill. This planning process needs to be designed to overcome real and perceived barriers, both those pre-

sented by language or local cultural and business practices, and those imposed by geography or natural hazards.

Information technology and electronic commerce offer small states unprecedented opportunities for reforming and re-engineering government services, for becoming part of global supply and demand chains, for creating new business opportunities, and for increasing the wealth, well-being and quality of life of their people. It will take considerable effort and willingness to change to take advantage of these opportunities. This applies to the governments of small states, beneficiaries of change and of aid, to the authorities of donor nations and to international agencies. We must all adapt, as Darwin told us.

Introduction

The Joint World Bank/Commonwealth Secretariat Task Force on Small States has been asked to assess alternatives and adaptations of policies to address the unique problems of small states, including their vulnerability to marginalisation, natural disasters, external economic shocks and other major issues of special interest and concern within a rapidly globalising economy.

Within this context, a paper was commissioned on new opportunities associated with the information technology revolution and from emerging electronic commerce practises. The brief is to explore the potential that IT and EC have to enable small states to participate in trade globalisation. This paper reviews the technology options available to small states and the business opportunities these options create. By analysing a range of a typical small state's strengths and weaknesses, it becomes possible to propose a prioritised plan of action, along with potential benefits, challenges, some idea of costs and inputs, institutional requirements, process improvements and a broad approach towards implementation. A discussion of the practical means by which these opportunities can be assisted by larger states will follow, sequenced according to practicality and the probability of success.

During the new decade, the size of the IT industry is expected to reach \$2 trillion. The trends are that hardware and software will comprise a declining proportion of the market but that services will grow at their expense. EC is being hyped as the fastest growing sector of IT and new business, but some care needs to be taken in extrapolating opportunities based on EC projections. Of the three major sectors of EC – Consumer, Business and Government – Business-to-Business is undoubtedly the most reliable and permanent in the short term. Consumer EC is still in the proving

stages while government EC could prove, in the long term, to be the most important and the largest sector. While it is misleading to quote potential market size, around 70 per cent of all international trade is already transacted electronically, using EDI (electronic data interchange, the progenitor of today's EC) and trade-facilitation techniques. In time, more than 20 million businesses will use EC for supply- and demand-chain purposes. Business opportunities and efficiencies are the imperatives in this global systems revolution. Even a small share of these markets will yield high leverage over initial investments for small states.

It should be noted that these technologies can be applied to improve government processes and capacity, to comply with pre-conditions for globalised trading, to improve necessary infrastructure and to generally improve competitiveness. They can also serve to create new opportunities for employment and business development. The paper will discuss relevant examples.

The paper is organised as follows. The section on the economic context provides a brief overview of the technology challenges faced by small states, the reasons for these challenges and some specific problems. The section on information technology and electronic commerce covers a general introduction to the technologies, what they require to be effective and some potential key benefits for small states. In the section on technology, government reform and efficiency we look at what is needed to exploit opportunities in the public sector. The section on best practice in IT and EC gives some relevant examples, infrastructure issues, the main stages of implementation and discusses what is needed to ensure success. We then ask: 'How do small states compare? What do they need? What is missing? Can the optimum and minimum requirements for small states be identified?' Following this discussion, we examine what is possible. This section identifies specific opportunities, how to go about redressing infrastructure imbalances, and some strategies and tactics. In the next section, 'Phasing of implementation', we point to pilot programmes and resourcing, plans for partnerships and suggested work plans. This is followed by a list of considerations to explore during implementation, in a section entitled 'Work plan – summary'. The paper concludes with suggestions and priorities, and offers specific action items for discussion at the conference.

The economic context

The main problems faced by small states include trade marginalisation, consequent social problems and frequent natural disasters. Many small

states are characterised by geographic remoteness, internal dispersion, with increasing proportions of the population moving to urban centres or overseas, frequent damage from extreme weather phenomena, and a heavy dependence on aid and on taxes and excises on trade.

The relative economic and geographic isolation of some small states is accelerating their exclusion from the global supply and demand chains, resulting in poor employment prospects for their populations. In many small states, there is growing frustration among the younger elements of the population. In the Pacific region, for example, 40 per cent of the population is under 15 years old and 20 per cent is between 15 and 24 years old. There is a widespread shortage of teachers, leading to a growing mismatch between skills and future livelihood opportunities. This has accurately been described as a 'poverty of opportunity', even though on the surface there is often very little observable poverty, as the term is conventionally defined.

Further contributing factors include modest to inadequate infrastructure in many cases, particularly for IT and EC initiatives, compounded by the lack of suitable educational facilities, lack of skilled resources, and a 'technology drain' with the brightest and most enterprising young people moving to better-paying markets. This leads to difficulties in compliance with the needs of global supply/demand chains, high transaction costs and poor performance in many aspects of international trade. Government services and efficiency also suffer as a result.

From the perspective of trade and income-generating activities, many small states depend primarily on primary and tertiary sectors of the economy, on the public sector and on tourism. For many small states the most important of these sources of revenue and employment include:

- ◆ Fishing and agriculture, including sugar, horticulture and fresh produce;
- ◆ Some mining and primary industry products;
- ◆ Some manufactured products, including textiles and apparel;
- ◆ Tourism;
- ◆ The public sector;
- ◆ A small maritime and trade-processing sector.

This exclusion or, at best, marginalisation of small states to the fringes of world trade is exacerbated by several trends and factors:

- ◆ The global supply chain is meeting a growing proportion of world trade. Over 40 per cent of world trade takes place between multi-nationals.

- ◆ Advanced economies are increasingly dependent on IT and EC for supply/demand chain efficiencies, for economic development and job creation, for compliance with the global supply chains business processes, for new business development, and for marketing of domestic industries such as tourism, horticultural and agricultural/fishing industries, primary industries (oil and mining), textiles, footwear and apparel manufacturing, communications, banking and finance, and information-based industries.
- ◆ The most sophisticated IT and EC resources and skills are dominated by the advanced economies.
- ◆ The economic barriers to entry are formidable.

However, these trends and factors – and perceptions of them – are counter-balanced by:

- ◆ Growing demand from advanced countries for new products, particularly fresh produce, agricultural products and primary industry products, and the consequent trend toward inclusiveness in the global supply;
- ◆ Growing demand from advanced economies for inexpensive labour closer to their markets. This includes, most particularly, IT skills at every level. However, it needs to be emphasised that the ‘virtual’¹ nature of IT and EC means that many of the technology-dependent operations are location-independent;
- ◆ Falling technology costs. There is a trend toward providing the technology free-of-charge, in return for a share of the resulting revenues (transaction pricing, Value-Added Service Providers (VASP));
- ◆ Opportunities to leap-frog previous technology generations by installing best practice, low-cost, higher-capacity and higher-performance systems, without any of the development costs previously borne by pioneering economies;
- ◆ Expatriates as an asset. Previous losses of the best and brightest young people to other countries mean that they can be deployed as expatriates to work on their country's behalf by technology providers. They are also a ready-made market for electronic commerce-facilitated trade;

¹In this sense, ‘virtual’ implies that operations seemingly performed locally are, in fact, performed at another location. Using the Internet, a local phone call can provide access to a website that appears to be a local site but is, in fact, held on a computer on the other side of the world. Similarly, a local toll free number can connect a caller to an operator several time zones away. Credit card operations and airline reservation systems are examples of ‘virtual’ telephone support or call centres.

- ◆ The Internet, which makes EC affordable for even the smallest enterprise. Company internal Internets (Intranets) and Internet networks exclusively for trading-partner communities (Extranets) enable inexpensive EC for every level of organisation.

It is clear that we are moving away from the generation of technology that only the wealthy economies could afford. In addition, globalisation of skills and resources, and the needs of the globalised economies, mean that, with the right help and strategies, any state or enterprise can participate in global trade. Large enterprises now need to meet the information and support needs of their suppliers, as well as their internal and external customers without regard to time and place. This requires building global IT and EC infrastructures and services associated with the new demands of international business.

Information technology and electronic commerce

IT is essentially the merging of four separate groups of technologies: computing, telecommunications, broadcasting and multimedia. The point at which they overlap is normally called IT by the practitioner and much of the private sector. International agencies, depending on their roots, often use other terms, such as informatics, ICT (Information and Computing Technology), or IT and T (Information Technology and Telecommunications). There is no significant difference between these terms; IT is the most commonly used but the others are equally valid.

IT implicitly refers to the technologies themselves and to the professionals who deploy IT, either at manufacturer and vendor sites, or at user organisations. At the user site, IT systems are applied to the individual enterprise, which may be anything from a one-person business to the largest multinational organisation. Their systems are designed for their specific, internal use. On the other hand, EC¹ systems are designed for inter-enterprise computing. EC enables any computer to 'talk' to any other computer. More typically, EC refers to the business practices that now take place with the help of telecommunication networks, most notably the Internet, but also including Value Added Networks (VANs), Virtual Private Networks (VPNs), Intranets and Extranets.

IT is the generic set of technologies that are used to create efficiencies in individual organisations. They include computers, communications and their attendant skills. EC requires the IT infrastructure as a starting point. It also uses sets of business procedures that enable the IT systems in the

¹Equivalent terms include E-Commerce, I-Commerce and Digital Commerce.

supply chain to inter-operate with each other, that allow governments to participate in these types of processes, and that also allow individuals to participate. EC uses a range of inter-enterprise initiatives (business, industry and government) that enable EC users to exchange information in standard formats so that the IT systems of any participant can recognise the electronic information being exchanged. These standards initiatives include messages (standard invoices, customs declarations, etc.), codes (product codes, bar codes, location codes – for example, airports and airlines, size and measurement codes and business practices), automatic identity technology such as scanning, wireless ID/transponders and GPS systems. But most of all, EC initiatives make possible JIT (Just-in-Time inventory control), QR (Quick Response retail replenishment), ECR (Efficient Consumer Response for the supermarket industries) and a range of systems in which governments participate, such as trade facilitation for automating customs and port processes, electronic tax lodgement, and electronic government and governance.

In the context of small states, EC and IT can be deployed for these tasks, among others:

- ◆ Efficiencies of industry and government, leading to productivity improvements and economic growth. In particular, there are opportunities for improved macroeconomic management and introduction of practical public expenditure/budget management and monitoring systems.
- ◆ Participation in globalised industries, leading to process improvement, business development, industry diversification, and employment opportunities.
- ◆ Opportunities to perform high-value operations at lower costs than in developed countries, thereby transferring employment opportunities, since EC, in particular, makes geographical location irrelevant.
- ◆ Trade process reform, including ports and customs, technical controls (prohibitions and restrictions, government trade licensing and approvals, and other non-tariff barriers), trade professionals and traders. This can lead to increased trade efficiencies and the ability to handle smaller consignments more efficiently and more often. It can also lead to efficiencies and competitive advantages in transshipment, transit and free port or duty-free zone operations.
- ◆ Increased tax revenues due to increased economic activity and improved government efficiencies, including state owned enterprises (SOEs) and government business enterprises (GBEs).

The technologies can offer many other potential benefits, but even this first look illustrates that IT and EC are no longer restricted to the big players. Properly planned and managed, they can be very effective in any environment. They can induce and introduce efficiencies that may have been considered to be impractical before, they can introduce new revenue opportunities for both the public and the private sector, and they can generate new employment opportunities. But to make the most of the technologies, it is necessary to make adjustments to traditional ways of doing business, in both government and private sector organisations.

Technology, government reform and efficiency

Most important, it is incumbent on government to initiate reform so as to facilitate the new world of technology-induced trade. And reform does not just include changing laws and regulations; it also includes reform of organisations, processes and attitudes. Clearly, any programme of reform must take into account local cultural issues and practices, which can make reform of governance and government services a huge and multifaceted task, involving elements such as legal reform, privatisation and contracting, training and education, and changes in salary structures. However, one central element of the process is improvement in information flow and processing. Here, IT can have a central role.

There are numerous computerisation programmes underway in government and government services at the national and local levels of government in developed countries. These are designed to smooth the interface between citizens and government, and to improve the quality of services.

A mass of evidence from case studies around the world suggests that introducing IT as part of a reform effort can have a dramatic impact on the quality of governance and of services from local and national level government – *if it is implemented in a supportive institutional environment, with the backing of key stakeholders, and in co-ordination with other projects.*

The challenge for the public sector in small states, no less than in others, is to find ways to adopt and use modern IT solutions. They can be a potent productivity tool and a platform for improved service quality, for 'formalising' public management processes and thereby reducing rent-seeking opportunities, and for strengthening government information flows, both inter-agency and with the private sector and civil society. Typically, earlier efforts to integrate IT into the operation of government, though an important first step, were not designed to form a co-ordinated, comprehensive reform and extension of information-based governance and government services. If small states are to reap the full benefits of the

IT revolution, this reform and extension will have to be a central element.

Firstly, *where IT applications are being implemented in an unco-ordinated manner without concern for interoperability, standards or economies of scale and scope, co-ordination is needed to overcome this.* In turn, this will necessitate reform of IT management within the government. The first step towards reform of IT use in government is to ensure high-level co-ordination and the support and co-operation of high-level stakeholders. A unified programme and oversight between ministries is needed to ensure (at the very least) compatibility between management information systems.

Secondly, *the full range of possible uses of IT in government should be examined, and areas for priority (co-ordinated) implementation established.* Possible uses break down into:

- ◆ *Clerical systems*, including office automation and email communication, high volume transactions networks (including revenue collection), immigration, utility payment and licensing systems;
- ◆ *Management systems* such as statistical analysis, information management, monitoring networks and planning models;
- ◆ *Public systems* such as participatory interfaces.

Thirdly, *selected IT priority programmes should be introduced, taking advantage of scale and scope economies wherever possible.* Possible priority programmes include:

- ◆ Creating a secure and, where necessary, bilingual, Intranet within the government for email and document handling facilities;
- ◆ Payment of utility bills;
- ◆ Reform of pension schemes;
- ◆ Computerising and reforming the customs and port handling systems;
- ◆ Pilot public information kiosks in rural communities.

Introducing IT into projects can be highly complex. Project success is thus profoundly dependent on the application of highly skilled technical and professional services – both in-house and contracted. Shortages of such skills are common. Public sector agencies, in particular, find it difficult to budget adequate resources for such ‘intangible’ services and/or to pay competitive wages and fees for such services. Compromises in this area typically result in problems arising in all aspects of an IT project. Also, the IT industry is highly unsettled. The rates of change in information technologies and in related methodologies are unprecedented. Moreover, the rate at which entirely new technologies emerge is exceptionally swift.

As a result, system managers must not only plan and execute programmes of rapid and continuous system renewal, but they must also programme for continuous extensions to system functionality. The pace of change affected by such programmes is virtually unparalleled in other technical contexts. Similarly, the horizon of 'foreseeable' future under which such programmes must be planned and executed is exceptionally short. Of necessity, learning, trial-and-error and mid-course corrections figure prominently in systems planning, implementation, and operations.

An agency which is considering the implementation of an information system must therefore first take very seriously the planning and acquisition of the system. It must invest substantial resources in these processes. Once acquired and implemented, a system will continue to require substantial resources for the effective management of the system's operations, as well as to sustain the system over the long term. These resource requirements include those for software maintenance, continuous technological updating and functional extensions.

It should be noted that reform of the use of IT in government itself is only the first step, and the impact of these reforms will be greatly dampened if the broader environment is not 'IT-friendly'. Here, government has a central role in:

- ◆ Human resources development in IT skills base;
- ◆ Ensuring the lower costs of information access and processing through removing, or at least lowering, the barriers to competitive entry;
- ◆ Improving customer choice, reducing costs, and improving quality of services through greater private sector involvement in telecommunication services;
- ◆ Supporting the development of an information culture, for example, through support for local-language content development;
- ◆ Supporting business and civil society interaction with IT-based government services through access, training, and support; this is especially important if access to services is to be equitable;
- ◆ Opening the IT sector to well-regulated competition, and reducing tariff and non-tariff barriers to foreign supply;
- ◆ Supporting business use of EC through regulatory and judicial reform which addresses also privacy and security issues;
- ◆ To help overcome resistance to change and the engineer employee-led transformation of work processes and attitudes through the adoption of IT based systems;

- ◆ Venture capital and/or co-ordination support for community information centres, Internet backbones and startup firms.

Developing momentum is crucial. There is a range opportunities for use of IT that remain only partially exploited in most small states:

- ◆ Better provision of government services using IT, including social safety nets and tax systems;
- ◆ Universal access to IT;
- ◆ Education, including use of IT as a pedagogical tool and lifelong training in information technology through the provision of computer facilities for schools, for students and community members;
- ◆ Legislation and regulation for electronic commerce, including reviewing existing laws and regulations in order to remove inhibitors to IT and EC, and to facilitate the widest participation in the information age;
- ◆ Innovative support for entrepreneurial activities in information industries or industries supported by information infrastructure;
- ◆ Support for local content sites, including for trade and tourism.

Follow-on work could move toward further development to take advantage of a range of opportunities discussed above, but the first step is clearly consultation within government and with civil society as to the direction(s) and speed(s) of change. Options for project financing in this area include:

Supporting joint strategies. Increasingly, efforts are underway to establish multidisciplinary task forces on the development of the informatics sector, recognising the centrality of a co-ordinated and widely accepted plan of action to respond to the changes engulfing the sector. A multidisciplinary team can be effective, with full time staff support. Action plans that are developed also include marketing and training strategies. Project funds might support capacity-building for co-ordination on broader Informatics discussions, helping to create a 'community of knowledge' among government departments through the provision of Internet access, and a central support staff.

Encouraging broad-based participation and use. If wide-ranging reform is to be both successful and equitable, stakeholders must be involved in the design and implementation of projects from the beginning. This suggests the centrality of participatory development in the process of moving toward an information economy. In particular, stakeholders should be able to form their own 'communities of knowledge' and 'communities of practice'. Here, project resources might go toward supporting an early

involvement of stakeholders in the design of future projects covering areas such as community access and the wider use of Informatics in schools, as well as using the tools of information infrastructure to improve business opportunities and broader development objectives.

Best practice in IT and EC

Countries with the best records in the use of IT and EC usually started by articulating a national vision for the technologies, by promoting technologies, and by allocating responsibilities to senior public and private sector bodies and to prominent individuals. They made provision of the right infrastructure a national priority, including educational and training needs. They set industry and public service priorities and introduced a range of incentives for innovation. The same is generally true of smaller or less developed countries that have taken the same approach, such as Singapore, Mauritius, Taiwan, New Zealand and Ireland. Of course, almost all these countries are wealthy, already self-sufficient or have powerful sponsors. The challenge for small states is to provide the impetus for similar outcomes from a unique, possibly new, mix of inputs.

Assuming the existence of a national vision and strategy, together with the right allocation of responsibilities, and that the availability of financial resources is not the most serious constraint, then the following are the main issues that need to be quantified and qualified in order to create an integrated project plan to offer the optimum potential for successful deployment of IT and EC.

Infrastructure requirements and minimum cost options

It is first necessary to assess the existing levels of power, telecommunications and computer infrastructures and compare them to optimum needs, so as to build a plan to bridge the gaps. The infrastructure does not necessarily need to serve the whole of society. Initially it can be targeted at the areas of best potential, such as particular government departments, customs and ports, key private sector enterprises, and selected educational and training establishments. The potential for VSAT telecommunications and wireless technologies should not be discounted. Offers of inexpensive reconditioned equipment and conditional special software offers from major vendors should be seriously considered. There is considerable room for manoeuvring in the establishment of an infrastructure for specific purposes.

Reform, legal and regulatory aspects for the implementation of a national IT/EC agenda

There is considerable experience to draw upon in this area. For example, the UN has for many years sponsored the UNCITRAL initiative (UN

Convention on International Trade Law). One prime example of their work is the model Electronic Commerce law, which is being adapted and adopted by nations around the world. The intention is to create a climate in which all trading partners, including government agencies, may with confidence use the technologies of IT and EC to conduct their business. The leading economic powers and the major multinational companies see this legal regime as a prerequisite for new entrants to global supply chains.

Technology and skills requirements

In addition to the raw materials of IT, such as telecommunications and computers, an IT/EC economy needs network service providers, such as ISPs (Internet Service Providers). These may be the local telecommunications company, but ideally they come from a deregulated and competitive marketplace. There are viable technical options to 'piggy back' on overseas ISPs and telecommunications firms' offerings.

A range of skilled technical people is required, and they are at least as important as the technologies. Strategies are necessary to develop local resources, to use contractors (including expatriates) and to make the best use of existing programmes and services.

Educational and training Requirements

A key component of developing local talent is to create the right courses with the best available teaching talent. Initially this may make use of overseas universities, remote and distance learning schemes, incentives to attract expatriates back to share their knowledge and some contracting. Once again, training should be highly targeted at actual project needs. It will not help to train people for work that does not exist. This educational programme, to be targeted at the creation of a cadre of IT professionals, begins with introduction of Internet facilities into tertiary and secondary facilities phased in over a period of, say, five years. It should also be inclusive of the adult population, in co-ordination with government and commerce/industry, to ensure the right levels of IT literacy for existing and continuing employment.

Field experience has shown that small, as well as large, countries are not satisfied with the prospects of entry-level IT jobs, such as data entry. They want a balanced set of skills to be developed, so as to enable all IT applications to be serviced locally, where possible. A key component in meeting this requirement is the teaching and certification of IT skills in context, for such key industries as agriculture, horticulture, textiles and apparel, international trade, tourism and public sector applications.

Commercial aspects of skills and technology sourcing

It may not be necessary to buy much of the computer equipment and

associated technologies. The IT and EC industries are already moving towards transaction pricing, whereby the vendor shares risk for a share of rewards. There is also a range of BOT, BOO, and BOOT – Build/Own/Operate/Transfer – contracts available. All are aimed at reducing up-front costs and risks until the project becomes self-financing.

Electronic government: improved efficiencies in the public sector

Annex 2 gives some ideas on current plans and practices in the area of electronic government and governance. In many smaller countries, the government is the largest economic power and the largest employer. It is potentially the largest procurer of IT goods and services. If the government itself does not embrace both the technologies and the new business processes made possible by the technologies, then a national programme is unlikely to succeed. So the role of government needs to be planned at the outset, as does the impact of government participation on public sector employment and the costs of transferring jobs from the public to the private sector, retraining and associated incentives.

Electronic banking and finance

Annex 1 illustrates the potential for banking and finance in the brave new world of EC. The participation of firms in these sectors is as important as that of the government. Some thought needs to be given as to how best to obtain the co-operation of this sector in the overall mission and in the implementation of national plans. Properly implemented, electronic banking and financial services can generate significant revenues and employment. It is also true to say that without electronic banking in the future, banks themselves – and their clients – will suffer.

Creating a national IT/EC strategy

A national vision and strategy for IT and EC is a prerequisite of success. Private sector initiatives might prosper on their own, but without the help and endorsement of government they are likely to have only a marginal impact on the economy. One of the key decisions to be taken is whether to adopt the technology for national competitive advantage, or to achieve parity with competitors and with trading partners' requirements. It is tempting to believe that there is still room for competitive advantage. It may be there, but it has become clear that due to the accelerating developments in technology a competitive advantage today might be a disadvantage tomorrow. Short-term advantages are just that, short-term. Efficiencies are forever, and complying with trading partner requirements is providing clients and suppliers with a greater level of service.

The level of debate must be thorough and it needs to be informed by expert input. Both long-term and short-term strategies must be considered, within well-defined objectives, which may vary for each country.

Implementing and managing a national plan

Once there is agreement on a national vision and a strategy to achieve that vision, it is necessary to select and manage priorities. A national plan is normally a long-term and complex series of projects. It needs to be managed full-time, by competent people. Many countries have opted to create a national organisation to manage this type of project. Virtually all of the successful national initiatives within smaller or developing countries have used the services of a national facilitating body. The organisation, through its Chief Executive Officer, might report to a national committee or directly to a minister. Its charter is to implement a plan in accordance with agreed time scales and costs.

Integrating implementation with transition planning

There is a great temptation to try a 'big bang' approach, to replace all of the old paper-based bureaucratic processes with modern computer and EC-based systems at one bold stroke. That approach cannot possibly work, although it might appear technically feasible. There are people, customs, traditions, and familiarity with traditional ways – as well as costs – involved. There is an ever-present risk of failure. It is preferable to implement a professionally administered series of transition plans, where each system is tested out in isolation and then gradually phased in based on full training and acceptance testing. It might be time-consuming, and it might appear to cost more, but it has more chance of success. More initiatives have failed because of the lack of transition planning than for any other reason.

Cultural conventions, business practices and language

Another series of factors to consider is local cultural and religious practice, and local ways of doing business and of managing enterprises. Once again, it can be comforting to think that technology can immediately dispense with local conditions. It cannot. Great care should be taken for plans to be adapted to local cultural factors and how they interact with transitioning to new practices.

Clearly there are many other considerations in formulating best practice for any country. Conditions vary, opinions differ and experience changes things. But there is a wealth of experience in implementing these systems, whether at firm, department, industry or national level. It is that accumulating body of experience that makes the next implementation much easier than the first. There is not much room for pioneering left.

How do small states compare?

Small states generally lag behind in both IT and EC. Investment, culture, skills, priorities and many other factors combine to create this condition.

Telecommunications monopoly and reliance on government sources of revenue from telecommunications and customs duties combine as an inhibitor to institutional change. A basic challenge associated with reaping the benefits of IT and EC is how to reform, deregulate and even privatise institutions without risking government revenue loss. The challenge of this project is to devise ways of transiting small states' economies into technology-led growth during the period of deregulation.

Suggestions in later sections of this paper include the concept of 'virtual' free-trade zones, in which organisations can participate in EC in a deregulated environment specially equipped and resourced for the purpose. This concept extends the idea of free-trade zones to electronic commerce 'virtual' free-trade areas which, because they are virtual, need not necessarily be in a fixed geographic location. Other suggestions include ideas on how quick start-ups can be achieved, with help from close and traditional partners, and from the international community. So while the current status might not, in general, seem to be too good, for others it represents a green field of opportunities.

What is possible?

IT applications hold promise for job creation in some contexts. IT has traditionally required a great deal of data entry for such tools as telephone directories, databases and so on. There are many examples of large catalogues, directories, and databases being key-entered into computers in other countries where data entry labour is either more plentiful or cheaper. That work exists in abundance today, with the caveat that quality, reliability and speed are of the essence. Many developing countries take on this type of work. While it is price-sensitive, it generates considerable employment.

India is an example of a country where programming for other countries is generating considerable income and jobs for well-qualified computer graduates, at salaries that are considerably less than those prevalent in more developed economies. There are various reports of shortages of programmers, some setting the figure at an international shortfall of over two million in 2000. Web page design, multilingual data entry, web page creation and translation, multilingual programme and systems support, remote technical support and remote consulting are all examples of 'exported' IT work available today. There are many other examples.

The following are two examples of current World Bank-supported work which could be replicated in other small states:

- ◆ The first project idea is to provide Internet equipment and training to members in a number of offices of the Windward Island Farmers' Association (in Grenada, St. Lucia, St. Vincent and the Grenadines, and Dominica). Skills and access will be used to support co-operative sales and facilitate direct trading with European and US consumers. This would help local farmers during a time of declining opportunities in European markets due to the renegotiation of the Lomé agreements and weak local market conditions. The target group is among the poorest sections of Windwards' society. The project provides them with training, access to information and communication technologies, and the opportunity for greater returns to labour through higher prices and reliable markets. The estimated project budget is \$950,000, providing a computer and communications equipment, training and first year communications costs for 12 sites. Recurrent project costs would be met through a fee on trade transactions facilitated by the Association. The timeline would be approximately six months from grant to implementation for equipment purchase, installation and initial training.
- ◆ The second project idea is for combined-service rural telecentres to provide Internet access for students and local communities. The centres would be based in rural areas in Grenada, St. Lucia, St. Vincent and the Grenadines, and Dominica to provide local schools with day-time access to computers and Internet for IT training and computer-based learning. The centres would also provide after-school paid access to local people for adult training and World Wide Web use in a cybercafe format. The target group for this project is the rural population, in particular students. The young rural population faces declining agricultural opportunities, at the same time as there are growing opportunities in traded information services industries, expected to create 1,500 new jobs in countries within the Organisation of Eastern Caribbean States by 2002. At present, however, rural students lack access to training in order to exploit these opportunities. The centres would also provide increased access to information on government services, adult education resources, etc.

EC initiatives include reform of customs and port systems to enable fast electronic clearances of import and export goods. This means that smaller shipments can also be cleared quicker making 'just-in-time' and 'quick response' global supply chain initiatives and participation with multinationals possible. These trade facilitation projects reduce transaction costs considerably and encourage transparency of transactions. Both improvements are welcomed by the international trade community and lead to increase in trade and improvements in the transshipment and

transit trades. Mauritius, Fiji, Bahrain, Lebanon and numerous Middle Eastern countries and developing countries are implementing these systems.

EC-based efficiency improvements in port operations can help make ports more profitable, encourage greater use and yield better offers for facilities managed or privatised ports. Greater trade throughput yields higher government revenues through customs and port operations. There are outstanding examples of port applications of EC and IT in both Singapore and Bahrain. Through deregulation and privatisation ports around the world are adopting trade facilitation and port information automation systems.

Other EC initiatives include tourism systems that enable easier booking of travel, resorts, entertainment and visas. EC developments include 'virtual' tourism, whereby potential visitors can see the type of room and tourist sites they might visit. Once a potential visitor has made an 'Internet visit' it is possible to market to them directly using the Internet and to monitor success rates. It is also possible to keep in touch with them before and after their visit, making the experience more personal and increasing the potential for return visits. It also increases the possibility that they will buy souvenirs either before or after their visit, once again over the Internet. The major CRS and regional tourism organisations are well into the planning phase for such initiatives. Their success could be enhanced by small states partnership arrangements.

There is a whole range of EC-facilitated efficiencies that can be offered by government – for service level improvement, for cost efficiencies and for revenue generation. Licences, visas and passports can be applied for, and in some cases obtained, over the Internet. Traders are able to obtain all technical controls in this fashion, saving considerable expense over time. Together with trade facilitation improvements, this will lead to lower consumer prices. Electronic tax lodgment, statistical inputs and social services can all be improved by EC. Government procurement systems using IT and EC are particularly beneficial. They offer more efficient tendering, contracting and buying, with a wider range of suppliers at lower prices, and they make possible lower levels of inventory holding. Savings of up to 20 per cent of government expenditure can be obtained by using these methods, complemented by modern contracting and pricing practices.

Textiles, apparel, footwear and other manufacturing operations can both sell and buy over EC networks. EDI (Electronic Data Interchange) is the means by which global businesses exchange all business information. EC makes this global trading borderless and timeless. Geography becomes almost meaningless with this type of trade. EC presents small states with

the opportunity to participate in global trade supply chains. Mauritius has adopted EC systems for integrating its textile and apparel manufacturing operations with global supply chains. It is also creating a sub-contract industry in Madagascar as a result of its success in this industry. Islands and territories such as Fiji and smaller African states and Indian and Pacific island countries could adopt similar measures.

Primary industries, agriculture, horticulture, the sugar industry, and fresh produce and local beverages can all be promoted to the global market using EC techniques. The Mauritius Sugar Authority and its horticulture equivalents have begun to implement electronic catalogues for Internet-based marketing of their produce. Several supermarket groups have proprietary systems and are interested in adding fresh produce and food and beverages from developing countries and new suppliers.

All of these examples are assumed to be 'professional' in scope and scale, that is, the trading partners are businesses or government. In some cases it might be feasible to sell souvenirs, gifts or books directly to consumers (Business-to-Consumer EC). But this requires a good fulfillment infrastructure, i.e. courier or express carrier services. Certain small businesses and local crafts can do well in this area but it cannot yet be planned on, with any great confidence, as a general creator of revenue or employment for small states.

Phasing of implementation

The following series of steps is proposed to help maximise the potential for successful results for a minimum investment. These steps are relevant to any geographic region. This proposal is intended to stimulate discussion on practical measures to successfully introduce EC for revenue and employment generation, as well as for skills development.

- ◆ Technology can help in some cases – but it is only part of the solution, though possibly the crucial part. Strong regional co-operation, external assistance, and patience are also needed. How do we communicate that message and obtain agreement?
- ◆ The need for change and the role of technology have to be broadly accepted at the outset. How do we best build awareness, bearing in mind resources and geography?
- ◆ Decision-makers need to be made aware of what is possible. How do we create opportunities to expand on awareness-building among decision-makers and major influencers?

- ◆ Assessments of a region's inventory of skills, resources, and technological progress are needed. They need to be analysed and results can then be compared to best practice¹ in order to draw up an action matrix. At this stage it may be useful to create a regional, or small states, marketing authority to sell a region's emerging expertise in selected sectors or areas.
- ◆ Potential projects must be identified, and priorities discussed and selected.
- ◆ Prior to implementation, we need to identify the best potential groupings of resources for specific opportunities. We need to quantify the need for external resources to complement internal resources, to increase the probability of success. Project planning, project funding, project management: who, how, how much, when?
- ◆ Implement pilots; carefully monitor, manage, measure – and adapt.
- ◆ Wide adoption of specific actions for clearly defined purposes.
- ◆ Build on success.

Work plan: summary

Once priority projects are selected for implementation, the following work plan can be envisaged:

- ◆ Identify local and expatriate talent in education, and in the public and private sectors. Address education, upgrade existing skills. Draw upon regional universities, distance learning programmes, implants from overseas universities in local facilities, short courses and scholarships – a good example here is Singapore 'scholars'. Certify local practitioners and training/education establishments.
- ◆ Establish connections and proxies with world bodies driving IT and EC, such as national IT and EC associations; regional bodies such as the Asia Pacific Economic Conference (APEC) EC group and the UN Economic and Social Commission for Asia Pacific (ESCAP); and international bodies such as UNCEFACT (the UN Centre for Facilitation of Procedures and Practices for Administration, Commerce and Transport), EAN (European Article Numbering), ICC (International Chamber of Commerce) and the UN Convention of International Trade Law (UNCITRAL).

¹The World Bank has a country assessment methodology under evaluation.

- ◆ Conduct awareness and country assessment exercises to establish a datum for skills and resources.
- ◆ Identify specific telecommunications and computer needs.
- ◆ Assess the value of regional hubbing for telecommunications, for business, IT and internet skills pool. This essentially means regional co-operation and facilities sharing arrangements between telecommunications companies and their main partners in order to fast-track EC facilities to selected small states.
- ◆ Evaluate the potential for departmental and village Internet booths, kiosks, value-added stores and traders.
- ◆ Look at virtual free-trade zones and virtual government systems. Aim to enable clusters of companies and selected government operations/ departments to receive economically priced EC access and IT systems. The national telecommunications company and regional/hubbing partners can establish ISPs for (an initially) exclusive groups of users, covered by special legislative and pricing arrangements to enable them to establish beach heads in EC, for business, government and educational purposes. They do not need to be clustered together in a particular physical location – EC techniques mean that they can be dispersed yet still considered to be a ‘free-trade zone’.
- ◆ Consider regulating Internet imports to a well-managed professional source, operated through proxy servers (i.e., exclusive to certain users). This means that EC-ordered goods are imported, initially, in an orderly manner so that small states’ procurement strategies can be drawn up regarding the role of EC in an overall trade policy environment, without prejudice to future options.
- ◆ Consider use of nodes to economic partner’s telecommunication systems or a regional hub for Internet, trade efficiency, port and customs systems, i.e. subcontract technology to a (generous) third party and access that technology through a local node at local call rates. This technology can include international Internet bandwidth, computing power, Internet merchant servers, consulting and development, and technical support.
- ◆ Look at VSAT and wireless technologies for Internet dispersion and local telecommunications bandwidth expansion.
- ◆ Examine a ‘buddy system’, or special relationship between technology partners and small states – even down to individual cities. Donors can examine the means to make this tax or cost-efficient for partners. Essentially this means establishing close relationships with expert

partners, enabling them to provide necessary skills, facilities and rapid market entry on a preferential basis, based on traditional relationships and trust.

- ◆ Focus on existing strengths to promote earnings and tax base – tourism, agriculture, horticulture, fresh produce, textiles and apparel, local foods and beverages, fishing, public sector and, most important, trade, efficiencies.
- ◆ Examine the potential for technology-based job creation through development of education programmes, technology skills, data entry, multilingual and cost-efficient call centres,¹ multilingual and culturally sensitive systems design and programming, 24-hour client support for existing international EC operators.
- ◆ Examine the potential for efficient Internet intermediary operations, such as buy from one place, sell to another, within and outside the region.
- ◆ Develop the financial services sector based on Internet principles. Examples include Internet banking, financial services, insurance, 24-hour product marketing and call centre support.
- ◆ Develop and expand on the concept of virtual tourism – for example, virtual sailing and virtual fishing, with international tourism operators, airlines and resort operators.

Suggestions and priorities

Small states can substantially benefit from IT and EC. The following is a list of specific actions that should be considered as priorities for many small states:

- ◆ Compile a work plan, including an EC Preparedness Assessment.
- ◆ Discuss the feasibility of a technological ‘buddy system’, even using twinned cities and donor incentives to assist this process. Nominate some key ‘hot house’ or incubator projects.
- ◆ Consider means by which to exempt EC from monopolised telecommunications rules in virtual trade zones, including IT initiatives.
- ◆ Target expatriates for trade opportunities and repatriated skills. Contact or establish an international supermarket/retail contact group to encourage assistance to small states. Enlist WTO/WCO (World

¹This is especially relevant around the dateline.

Customs Organisation) and UN peak industry bodies to help, if and where possible.

- ◆ Encourage vendor 'tiger teams' to implement key pilots as part of international aid/international assistance. Discuss potential with agencies such as the World Bank, Infodev, UNDP, bilateral donors, International Telecommunications Union, EU and regional development banks.

Annex 1. Electronic Commerce Practices

Figure 1 illustrates the administrative functions of an organisation serving internal processes and the supply chain, generally called the *back office*.

The order processing and sales and marketing functions dealing with the demand chain, i.e. the organisation's clients or customers, and their clients and customers, throughout the complete chain (see Fig. 2). This is often called the *front office*.

Hard goods, or those goods that have a tangible physical presence requiring elements of traditional delivery, such as packaging, transport and receiving processes. *Soft goods*, or those items that can be delivered by the network and computers themselves, such as software, publications, a range of Government and marketing services, some financial services, consultancy, music, etc.

Engineers used to differentiate between computer hardware and software by saying that computers were the 'bits you could lean on'. The same differentiators apply to hard goods and soft goods.

Supply chain (see Fig. 2): One can be taken as the inverse of the other. As the retail end of the supply chain might see it, the chain is the interlinked network of all suppliers that comprise the raw materials, assembly, packaging, warehousing and shelf-stocking of the goods sold by the retailer. Typically the supply chain only considers those organisations that are actually on the critical path of supply. To be complete it should also embrace services to the supply chain, such as distribution, banking and insurance, government services, trade facilitation processes, etc.

The *demand chain* is essentially the same as the supply chain but is seen through the eyes of a supplier to that retailer, either directly or through other links in the chain. The concept of the demand chain and the application of EC to its management is a recent development but will be widely adopted and heavily influenced in the future by EC techniques. Currently neither supply chain nor demand chain management has made many inroads in the chain management process, apart from the links immediately on either side of the major trading hubs, such as retailers, auto manufacturers and other manufacturers, supermarkets and some government processes. Note that the payment process and aggregated profit throughout their supply/demand chain are known as the *value chain*.

MRO, or maintenance, repair and operations: These are supplies that cannot be automatically replenished, such as spare parts for capital equipment, public utility bills, cleaning and maintenance supplies, etc. EC can help but it still takes manual intervention to initiate replenishment of these non-periodic supplies.

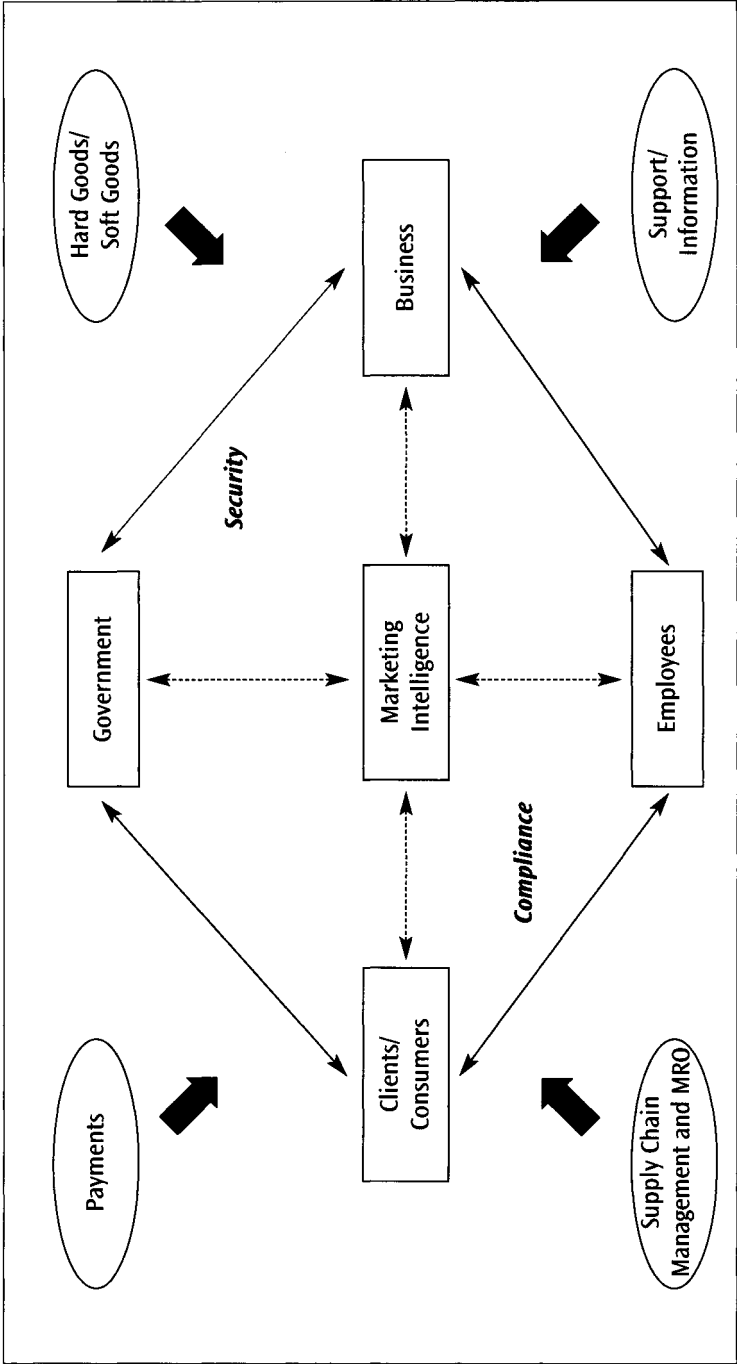
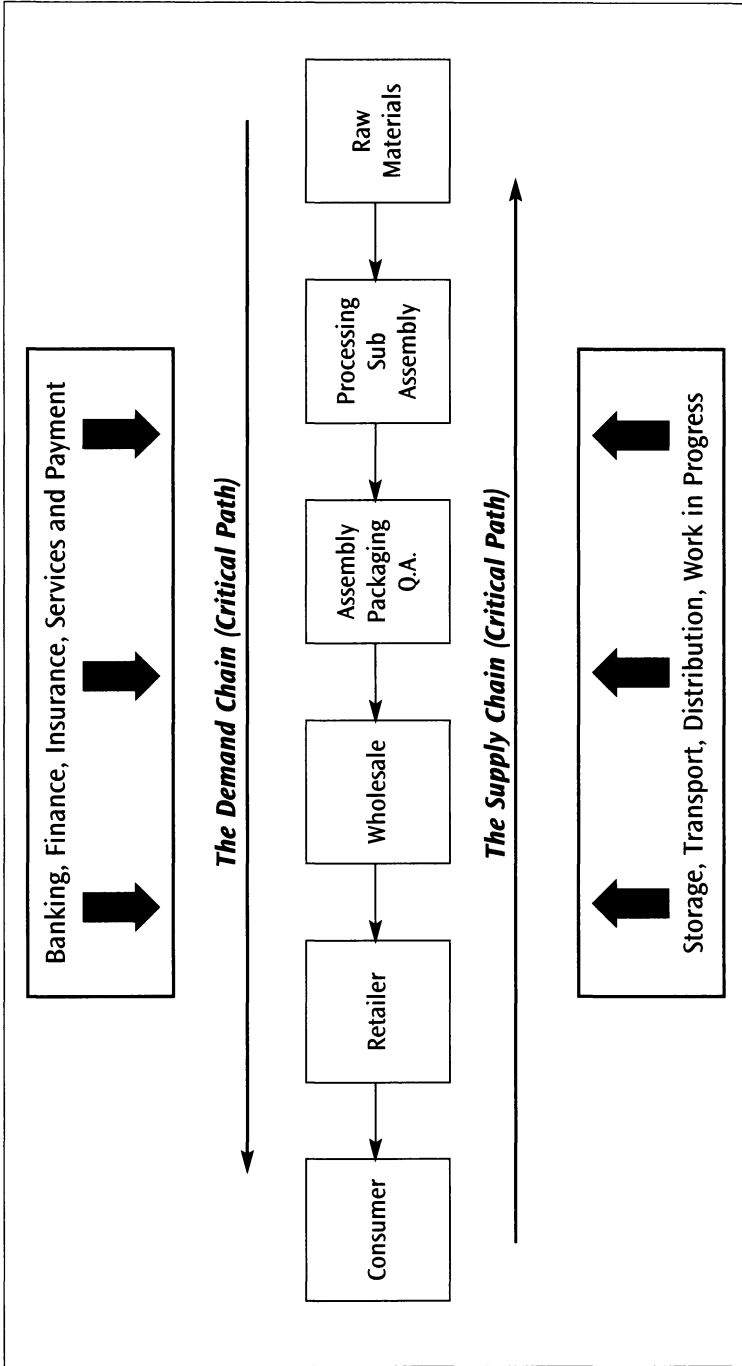


Figure 1. Elements of EC

Figure 2. Supply and Demand Chain



Support information refers to client and customer support using call centres and automated enquiry techniques. It also refers to techniques such as track and trace, used to provide the support services with the information they need to provide delivery and status information.

Marketing intelligence in the EC scenario illustrated refers to the techniques of automatically (through the network) gathering data about individual clients and their purchasing patterns in order to design 'one-to-one' marketing campaigns for individual clients.

Everybody wants to be a retailer

Today's Quick Response (QR) and Just In Time (JIT) systems are a direct result of the last 70 or so years of evolution of retail-driven supply chain management methods. Electronic Commerce is the latest technological enhancement to this process; it has the potential to automate all supply chains, no matter what the industry or enterprise may be. EC offers the promise of bringing buyers and sellers together, without intermediaries. Everybody wants to be a retailer.

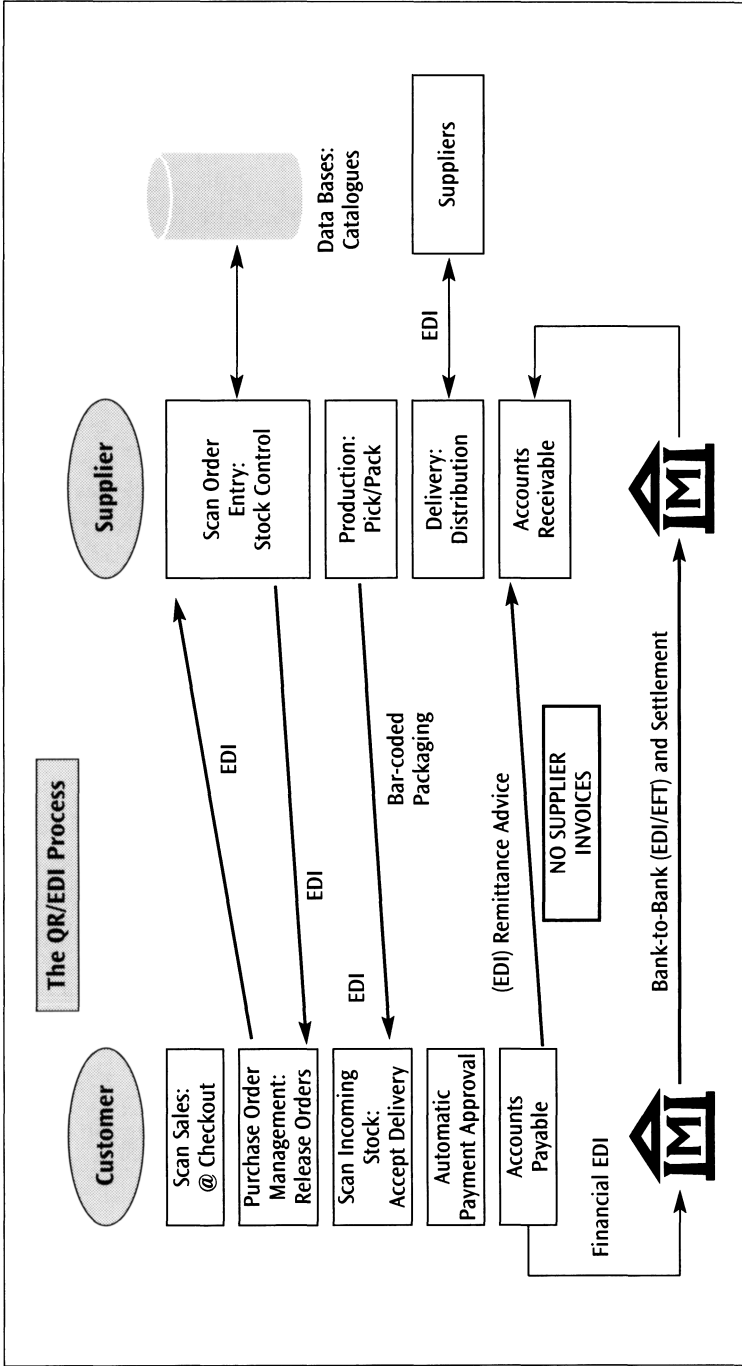
In fact the role of intermediaries will be redefined under EC, perhaps as electronic information brokers, for example. Nevertheless, traditional intermediaries are under some threat because their specialised knowledge and contacts are often neutralised in the electronic world.

Retailing

To use a nautical analogy, you cannot plot a course until you know your exact starting position. Since many people's perception of EC is that it is a retailing revolution, let us begin with retailing.

Today's retailing supply cycle has evolved over the last 100 years or so since the introduction of department stores revolutionised retailing. Quick Response characterises contemporary best business practice in the retail industry, as Just in Time inventory control does in the retail supply chain. These supply chains are now 'pulled' by electronically-captured consumer sales data. In this scenario a retail sale (i.e. the product bar code) is scanned at the point of sale. Payment is also made at the retail point of sale, increasingly by Electronic Funds Transfer at Point of Sale (EFTPOS). Sales are aggregated and transferred to the host computer where they are processed by an Enterprise Resource Planning System (ERP), Manufacturing Requirements Planning System (MRP) or Distribution Requirements Planning System (DRP) to calculate replenishment order quantities. Orders are then automatically issued by computers using Electronic Data Interchange (EDI) methods to a wide range of suppliers (see Fig. 3).

Figure 3. Supermarket Stock Replenishment



slimmed down version. This is another reason why everyone wants to be a retailer!

Similarly, EDI has so far only penetrated the first layer of the retail supply chain. EDI is difficult to integrate into the business system, especially where trading partners have tried to integrate their systems into a 'virtual supply chain'. This has also made EDI expensive. In addition, Value Added Network Services (VANS) charges, at up to \$1.00 per message (send and receive), have proved to be expensive for most companies, for whom these are an additional cost. EDI generally only yields tangible benefits when a critical mass of suppliers are using the technique. Naturally, the largest EDI users get the best deals from the VANS, and no doubt from ISPs. The reverse is seen to be true for SMEs.

Finally, many banks have never truly committed themselves to open Financial EDI. They typically require a direct entry (D/E) system through a private network to a nominated bank which will then clear payments through one of the clearing processes operated by members of the banking community. This is not, however, true of the USA or some European nations but it is true of the majority of countries. A D/E user is effectively a user of the bank's own internal closed, proprietary (therefore perceived to be secure) network. In countries where FEDI is in use clearances can be made overnight or even twice a day. FEDI charges are often identical with VAN prices in this scenario, which are generally cheaper than D/E bank charges. This is one of the reasons that the Remittance Advice (R/A) is often sent by the VAN, not by a bank.

The idea of QR and JIT is to remove slack from the supply chain. The term 'slack' describes excess inventory, excess costs and excess information. The technology keys to this retailing revolution are bar coding, product numbering, industry coding systems, scanning and re-engineered systems to take advantage of these technologies. EDI is used for inter-company transactions in a standardised manner. Both communications and information are standardised, so that any company may participate. All standards used are open standards – that is, they are agreed by all participants, at industry, national and international levels.

The whole process of automating the exchange of information throughout the supply chain had become known as Electronic Commerce (EC) by around 1992–93 (see *The Journal of Electronic Commerce*, published by the EDI Group, Chicago). The same techniques have now been applied to virtually every type of industry and government enterprise. Electronic Tax Lodgement, Electronic Customs Declarations, airline passenger pre-clearance (PAXLST, or Electronic Passenger Manifest) are examples of hundreds of different initiatives.

In QR and JIT systems stock is replenished based on actual sales. Purchase orders and supply schedules are no longer based upon forecasts from buying departments. In these systems orders are electronically acknowledged by suppliers. After picking and packing, replenishment consignments are electronically notified by Advanced Shipping Notes (ASN) to Distribution Centres (DCs) before physical delivery. In this way, DCs are ready for receipt of goods at the precise time of delivery, often within 10–20-minute delivery slots, or windows. As incoming goods are processed by the DC the consignment's outer cases (cartons) are bar code scanned, the resultant data compared to the Purchase Order (PO) and the ASN files and approved for payment by the same process. Payment and payment advice is then electronically facilitated by Financial EDI (FEDI).

A DC is a special purpose warehouse designed for the JIT replenishment of shelves in fast moving goods stores such as supermarkets and economy apparel stores.

In the payment process described above, there is no need for supplier invoices – scanning of goods supplied and comparison against the Purchase Order is all that is needed. This process is known as ERS (Evaluated Receipts Settlement).

When payment is made to the supplier under this ERS system, as in many FEDI systems, the funds transfer instruction (EFT) is electronically transmitted to the payee's bank, which then informs their client, by an EDI credit advice message that payment has been received. Perversely, the remittance advice is often carried over a VANS system because, to be integrated into an ERP or back office accounts system, the detail of the remittance advice has to conform to the original purchase order in internal formats, and to the internally stored electronic invoice detail retained in the accounts receivable files. Bank supplied remittance advices correspond to the detail on a check stub – a record of payment but one with no transaction detail. That is insufficient for an integrated ERP system.

The same processes happen throughout the complete supply chain, all the way back to the raw material producers. At least this is best practice theory. In fact, it is only the very largest retailers who have embarked on such programmes, generally in the supermarket, apparel and department store industries. Discounters, chain stores and 'category killers' (for example specialist sports goods) usually have a more restricted range of goods which are often supplied on a form of consignment such as Vendor Managed Inventory (VMI). VMI means that the manufacturer or the vendor owns and manages the inventory at the store until the sale is scanned. They may use EDI for supply chain management but only in a

By mid-1999 there were approximately 250,000 EDI users around the world, including virtually all of the world's major industries and governments. Major VANS such as BT, GEIS, AT&T and IBM carry billions of these transactions each year. There are hundreds of software houses and consultancies dedicated to the professional EDI industry. Standards are well developed and supported by bodies such as the UN, ANSI and the world's major peak industry bodies, for example EAN (European Article Numbering) and UCC (Uniform Code Council). The development of a retail consumer form of Electronic Commerce can only amplify and accelerate the well-established EC movement. EDI and 'little edi', or EDI with a less stringent application of standards using the Internet and web techniques, is at the beginning of an exponential growth which will probably lead to 1 million EDI users by the end of 2000.

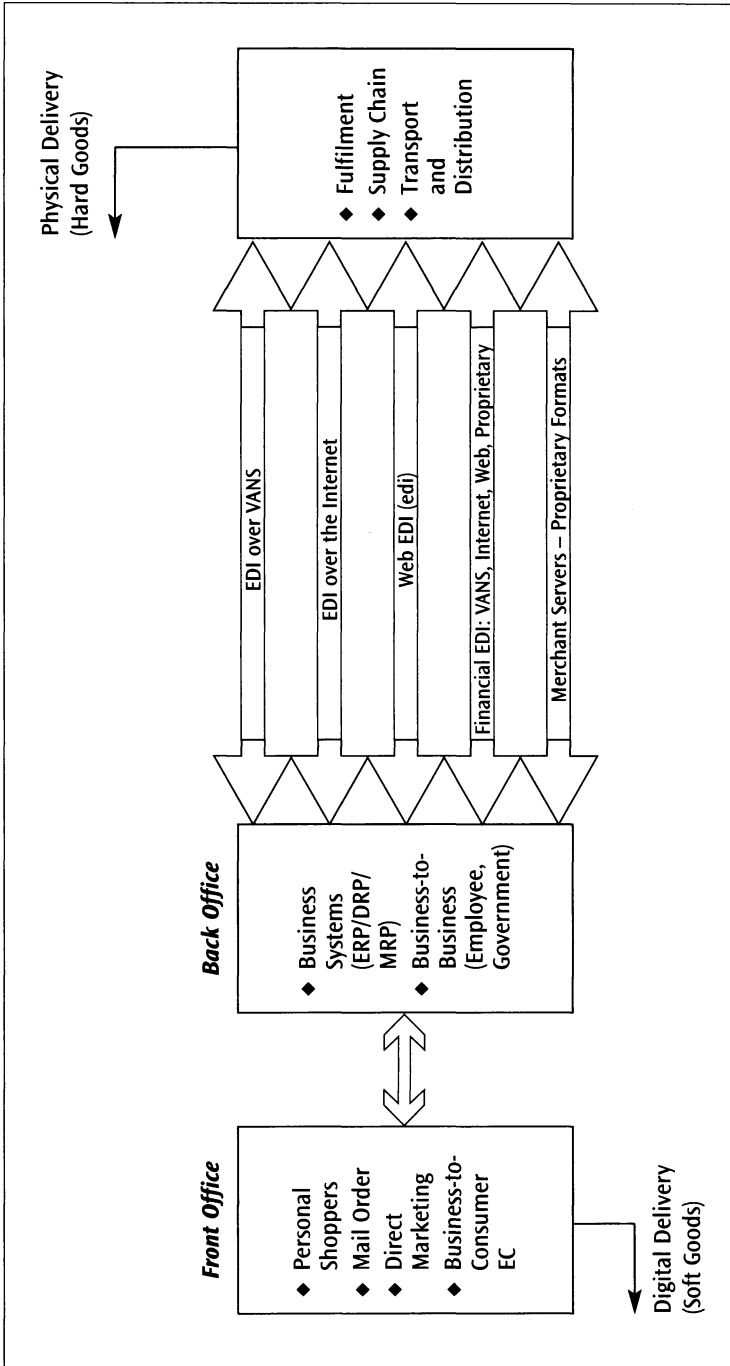
Figure 4 illustrates the position that EDI and formatted messages occupy in EC. It also highlights the role of the front office, the back office and the fulfillment and distribution operations. The front office includes all personal shopping methods, from personal visits, to mail order, to direct marketing and telephone sales to hybrid CD-ROM/EC sales. (Some companies distribute CD-ROMS containing catalogues. Provided that the user is Internet capable these CD-ROMS have 'hot links' which enable direct Internet connection to the web site of the vendor's catalogue.) As Internet bandwidth increases this hybrid form of EC will probably disappear.

The back office includes all of a supplier's internal business processes, including ERP (enterprise resource planning), MRP (manufacturing resource planning) and DRP (distribution resource planning, for retailers). It also introduces the concept of a front end to internal IT systems for business-to-consumer, employee, business and Government processes.

Figure 4 shows the types of messages that pass between back offices and the fulfillment process. These include conventional EDI, using VANS, the Internet, web EDI (or 'edi', where the message formats are proprietary rather than conforming to national or international standards). Web EDI and standards-based EDI are not mutually exclusive. In time it is probable that all forms of EDI will conform to agreed standards, but the speed of development of new Internet products has caused many vendors to bypass accepted standards in the hope either of setting new standards (i.e. their own) or making sales without commitment to the standards process, or from ignorance.

Some proprietary or closed community formats are proving quite acceptable to large corporations. For example, where two corporations have identical ERP implementations, there is no reason not to exchange messages in that context. But for open systems purposes that approach will

Figure 4. EC Information Flows



not work, since disparate message formats need to be ‘mapped’ to internal formats. This is the function of the EDI translation process

The big picture

Back to business processes

The main purpose of this section is to describe the complete end-to-end EC process. There is a direct correlation between EC and emerging business practices since one makes the other possible. Figure 5 illustrates the five building blocks of both EC and the emerging EC-based business practices: goods and services; point of sale and point of contact; pay and settle; fulfillment and distribution and the supply chain. Note that pre-contractual activities, such as advertising and promotion, are implicit in the point of sale activity.

Note that the diagram does not make specific reference to government systems and compliance requirements. Nevertheless, there is a huge potential for ‘Electronic Government’. Government applications include electronic services delivery, electronic benefits transfer, licenses, approvals, tax lodgements, systems for the technologically and financially disenfranchised based on smart cards, government purchasing, statistics and perhaps, one day, even electronic voting and referenda!

Front office, back office

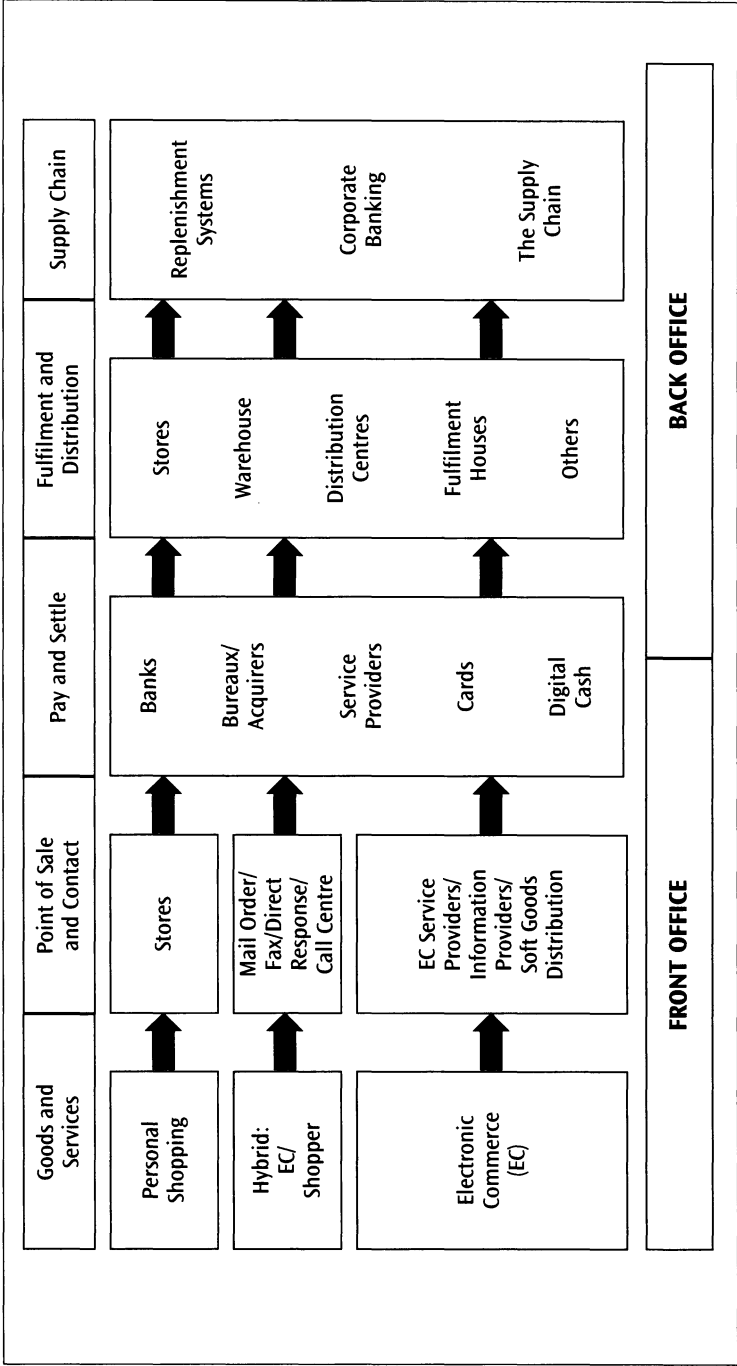
The emerging focal point for EC, especially in the commercial world, is the concept of the back office and the front office. Essentially this means the systems that enables customers (front office) to use EC to do business with an entity, or with their suppliers (back office).

The currently popular terms used to describe the function of EC are ‘Business to Consumer’ and ‘Business to Business’. There are other categories, as Figure 6 illustrates. The expression ‘business-to-business’ is inexact and sometimes misleading. In EC systems it is not always possible to tell who is accessing the automated point of sale/point of contact. It could be a retail consumer buying in wholesale quantities or a business buying in retail quantities-or one of many other variants. The term confuses the technological process with the business practice. Therefore this paper uses the terms ‘Front Office’ and ‘Back Office’ for brevity and for clarity. Front Office is widely interpreted as the customer interface; Back Office as the supplier interface. However, a brief explanation of the terms ‘Business to business, consumer, employee and government’, etc. is included later in this annex.

Front office

The Internet is now entering its third phase. From its inception in 1969

Figure 5. The Big Picture



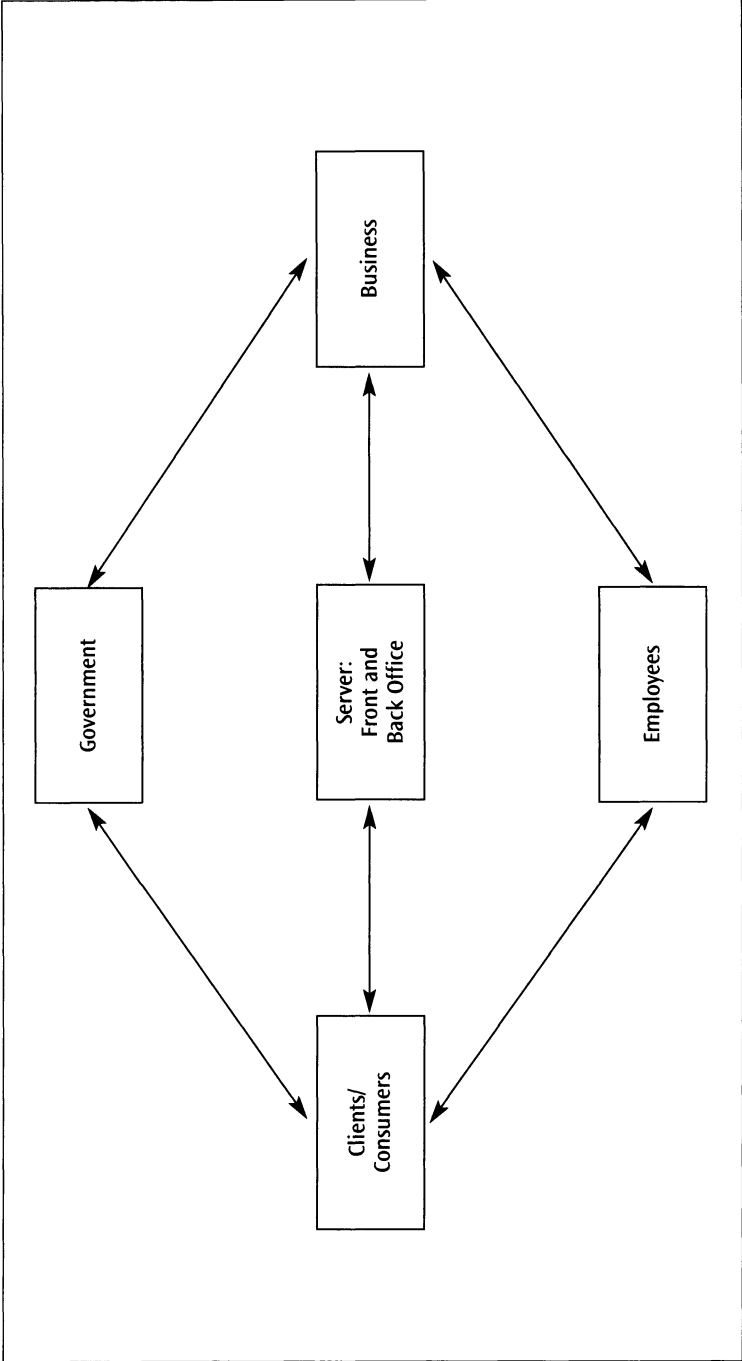


Figure 6. EC Trading Partners

the net has evolved through e-mail, web browsing and, latterly, transaction processing. Another way of looking at it is that interpersonal communications dominated the first generation of EC, even though telex, fax and e-mail may have also been used for ordering and other business purposes. The second generation took up from the point where it was possible to communicate between computers and to first automate the business-to-business and supply chain process with EDI. The web and the Internet have broadened that concept, adding multimedia, inexpensive, almost universal, access, and the ability to automate the demand chain and the MRO purchasing processes. Even greater access, new access methods, higher bandwidth, automated multilingual processes and even cheaper costs will, no doubt, characterise coming generations of EC.

Phase one: e-mail

For its first 25 years the Internet was used almost exclusively by academics, researchers and US defence personnel. The original and principal purpose was to exchange technical information by way of file transfer (file transfer protocol or FTP is the name used to describe the manner of exchanging this sort of data today) or now, more typically, by electronic mail (e-mail).

Phase two: web browsing

Over the last few years it has been possible to wander through all of the information contained on the computer files accessible by the Internet (the net) by using software called browsers, or web browsers. The term 'web' is a metaphor for the network of networks which comprises today's Internet construction. Web browsers enable any Internet user to locate and to read any 'page' of information that has been given a web address (or URL, Unique Resource Locator). This concept has become known as the world wide web (www). Hence any organisation can now create content on computer files, in any format, but generally in attractive, easy to scan and read, multimedia formats. Multimedia implies a combination of text, image, video, graphics and sound. A multimedia web page can contain all of the graphics technology used by today's video and television. The term 'page' is another metaphor, this time for an unlimited amount of information in any multimedia format that can be stored, retrieved and accessed by Internet www technology from a single address (URL).

Phase three: transaction processing

The third phase of the evolution of the Internet is emerging as 'transac'. This means that anyone using the net can actually issue commands or requests to any other computer on the net to follow certain instructions. Home shopping is the most quoted example.

The location of the home page, or the 'hosting' of a home page, is the

scene of much rapid change and turmoil. As we will see later on, during the discussion of Back Office EC, anyone who is Internet capable can host a page and become a retailer – or so it would seem. Typical home page hosts include retailers themselves, looking to complement traditional methods of retailing, to provide extra sales outlets or to achieve cost reductions. There are some ‘virtual retailers’ who operate without any physical stores. They just capture the transactions and obtain commissions from the manufacturer, retailer or broker, or from anyone else who actually stocks the goods. They may even obtain commissions from the courier or shipper who delivers to the home for a delivery fee which is added on to the cost of the goods. There is a wide range of other intermediaries striving to capture the transaction, such as Internet Service Providers (ISP). ISP are intermediaries who retail Internet services to the smaller user. The larger users, such as major retailers, will ultimately provide their own Internet hosts, although they may currently use an ISP for convenience.

C, B, G and E

Every technology spawns its own jargon. In the case of electronic commerce, a comprehensive new lexicon of acronyms has evolved, synonyms, abbreviations and new meanings for old words and phrases. The grammar of this EC world makes it difficult to write for anyone except for the cognoscenti, while any attempt to interpret or explain for the uninitiated runs the risk of being regarded as patronising by many otherwise well educated people. Take the terms being used to describe the trends in which buyers and sellers are beginning to change their trading patterns. Figure 6 recognises four distinct groups of buyers and sellers. In fact, the people and organisations in these groups overlap, sometimes across all four categories – business, consumer, employee and government. It is not only possible to belong to at least three of these categories simultaneously, it is also possible to do business of some sort with three, or even all of them, also simultaneously.

But that complicates matters unnecessarily. We use these four terms to differentiate the type of business, or transaction, that each generally does with the other. Further, it is implicit in the use of the term that business goes in two directions. For example, business-to-consumer is taken to mean that businesses sell to consumers. But consumers also sell to businesses in some cases: there are considerably more one-man businesses than there are corporations in the world. The following chart illustrates the potential for cross trading. It shows that in almost every case, each category is capable of doing business or to deploy electronic commerce processes with each other.

Table 1. Cross trading

	Business	Consumer	Employee	Government
Business	X	X	X	X
Consumer	X	X	X	X
Employee	X	X	X	X
Government	X	X	X	X

For example, a business entity in textiles or apparel manufacturing could sell 'seconds' or contract overruns to its employees (excess materials or garments, say); it sells them to other businesses (for example, retailers), direct to the public and to the government for government employees (for example, uniforms or nurse's clothes). Furthermore, that business will buy supplies from the individuals (outworkers), from other businesses (for example, fabrics, buttons or buckles). It may have to obtain licenses and approvals to import and export from the government; it may even bid to buy government surplus in auctions. Each case is different and complex, so that labels such as business-to-consumer can be misleading. In the event, today we consider that there are four main categories of commerce for simple categorisation: business-to-business; business-to-consumer; business-to-government and business-to-employee (B2B, B2C, B2G and B2E).

The technology vehicle for all of these activities is typically the merchant or site server, although no doubt that name will change. The function of this server is to insulate back office systems such as ERP from the communications and translation/formatting functions of electronic commerce. It is also the gateway to all the networks and services used in electronic commerce by the entity. The server thus sits between corporate IT systems and the electronic commerce service providers and their networks. It may be physically separate or just logically separate; the basic functions are still the same.

B2C: Business-to-Consumer

The idea is that a company or organisation sets up a website to enable individuals (consumers, clients, citizens) to select and buy product direct. Consumers can communicate through their own computers, kiosks or bureaux (Internet cafés), cable TV-Internet or a range of Internet devices. As previously discussed, the order may not go to the operator of the website; it might go direct to the manufacturer or retailer. If the goods or services are not offered free of charge, the payment might go to the manufacturer or retailer, but is more likely to be switched to a bank or to a card acquirer. The goods themselves can be conventional hard goods, in

which case the order is switched to a fulfillment house or warehouse, or the retailer or manufacturer. Or they can be soft goods, such as publications, software, financial or insurance services, consulting or health services, employment opportunities, real estate information, gaming or entertainment services, on-line auctions and a wide range of information or knowledge services, or many other varieties of goods and services. All may be delivered over the network to paying customers.

B2C is designed to increase sales, sales outlets, to support distributors, to reduce sales and support costs and to improve a customers options and levels of service. It offers branding opportunities and the potential to develop new, Internet enabled or enhanced products or services. Although the B2C business is not large at the moment, compared to B2B, it is nevertheless seen as a vital method of marketing, selling and distribution by those organisations wishing to place their products and services directly in front of the consumer. Investment and risk is still high; returns in the B2C arena are ephemeral at the moment, but there will be winners and losers in time.

B2B: Business-to-Business

The B2B market is aimed at specific areas of company sales and purchases. It enhances existing EDI/EC initiatives by enabling smaller members of the supply and demand chain to participate. It can remove some of the effort and costs involved in traditional EDI, especially in standards compliance, since it can translate in an any-to-any format. It also makes possible MRO automation. In addition it integrates all EC methods under a single umbrella and integrates different payment methods and message transfer between front office and back office operations, especially ERP/ MRP and DRP systems integration.

B2B is possibly up to 50 times larger than B2C in financial terms. It enables sales force automation or elimination of existing sales techniques. It offers much better communications between buyer and seller – no matter where they are, a key consideration for multinationals, and much easier integration into a complete supply/demand chain strategy. There are already significant success stories in the B2B arena; there are comparatively few in the B2C area.

B2E: Business-to-Employee

A checkpoint on an emerging application area: many people will be familiar with buying a T-shirt from the company shop. Some companies now allow you to buy using the corporate intranet, or by secure remote Internet access. A variant from an emulated business-to-consumer application is where employees may have purchases deducted from the payroll, or from allowances. Allowances or entitlements for clothes or equipment

are often the norm in the armed services, police, fire services, airlines, banks, health services and so on. These systems have to keep track not only of entitlements and usage, but also accounts, sizes and up-to-date measurements, location and other variables. This application promises to be an important hybrid of business-to-consumer and business-to-business.

B2G: Business-to-Government

Annex 2 concerns electronic government and discusses it in some detail. Briefly, the aims of B2G and the other variants are to remove delay and cost from dealing with the government. This can be for a simple license application to paying fines to visas and passports to business approvals, government information, buying from government, and so on.

Electronic commerce summary

Internet enthusiasts talk about 'dog years', an analogy where one year of Internet developments equals seven years of real time. However, no matter how fast the technology moves, business processes change at relatively glacial speeds. The legacy of partners, suppliers and customers means that any change needs to be harmonised with all parties. This is one of the lessons this chapter has tried to stress. EDI has taken over 10 years to penetrate only 250,000 out of possibly 20 million corporations for whom the technology will ultimately be of benefit. EC will doubtlessly move faster, but it will still take time to become fully absorbed into business practices.

We have briefly considered e-mail, messaging, web browsing and transaction processing. Transaction processing covers the categories business-to-consumer and business-to-business, business-to-employee and business-to-government. Each of these complements existing EDI VANS based systems and also the emerging EDI initiatives over the Internet and web, forms-based EDI.

Payment systems have evolved from proprietary direct entry systems to corporate EFT to Financial EDI (FEDI) and now to FEDI over the Internet. Recent corporate purchasing card initiatives, combined with corporate electronic wallets at both consumer and business sites, hold out the promise of revolutionary re-engineered systems, especially when debit cards and stored value/smart cards, together with electronic real time statements and electronic bill presentment are taken into account.

Managers need to take a new look at their IT infrastructure when considering the brave new world of electronic commerce. Systems will soon need to faultlessly operate around the clock 365 days a year. When a business becomes dependent upon EC, even one minute of computer and net-

work systems downtime will have cataclysmic effects on the business. Companies will become differentiated by their IT systems performance, especially where suppliers and customers are also dependent upon those same systems.

Many vendors now realise that their principal asset from the client's perspective is the quality of advice they can offer, the reliability of their systems and their banking relationships, especially in time-critical 24-hour electronic banking. Vendors are also coming to realise that in addition to a consulting service, they need to offer branding and marketing services, implementation services, and development services and support – in other words professional services in all aspects of customer service. This will obviously involve partnerships, especially for global implementations and for trading partner roll out and recruitment.

Tomorrow's EC world will feature a reconfigured vendor scenario. Payment for goods and services to the IT vendor community is moving inexorably to transaction-based payment; where if the client succeeds, so will the vendor, and vice versa.

Annex 2. Electronic Government: Using EC to Improve Government Services

It is easy to complain about government – we all do it. If something goes wrong that we feel powerless about we ask: ‘why doesn’t the government do something about it?’ The truth is that it probably is, at least, trying to. We demand more and more of our governments as we learn more about what is possible and what is needed. From a government’s perspective it is a never-ending battle to provide citizens and voters with adequate public management and services from an inadequate budget. And as the world becomes even more complex we see the need for ever more government. Perhaps we will one day see Ministers for Outer Space, the Arctic and Antarctic, and even a Minister of Electronic Commerce!

If we set aside the grandiloquence of the constitution – whatever form it may or may not take – there is a reasonable set of apolitical objectives for any administration which includes:

- ◆ Acceptable levels of service for government functions;
- ◆ Economies and efficiencies, resulting in good value government;
- ◆ Personalised service;
- ◆ Equal access to government for all;
- ◆ Speed and responsiveness;
- ◆ Responsible and measurable government;
- ◆ Best practice and consistently reforming and improving government.

This final point is axiomatic. We expect government to constantly re-invent itself to match changing circumstances; to regularly redefine its relationships with the stakeholders in government. From time to time, as opportunities present themselves, we expect a fundamental transformation of government. And electronic commerce is beginning to provide just such an opportunity.

Functions of government

The following ministries, functions or departments of government are generic. They are specific to no particular country. However, they do cover many of the important functions that citizens have allocated their government to handle on behalf of the nation. Responsibilities range from policy to supervision and include:

- ◆ Administration, or the running of the day to day business of government;
- ◆ Information – typically, access to public information and sources;
- ◆ Agriculture (and fisheries);

- ◆ The arts;
- ◆ Attorney General, justice, the senior official in the legal fraternity, the legislative process and the system of justice;
- ◆ The Cabinet – the small group of Ministers who make final decisions and recommendations to the law making bodies; the administration of cabinet affairs and the select group of departments that report direct to the Cabinet, or the Cabinet Office;
- ◆ Commerce, economy and planning – those Ministries that supervise and direct the national economy and specific sectors within it. They may also be responsible for a range of licences, certificates and approvals in connection with trade and economy;
- ◆ Consumer affairs;
- ◆ Defence – the armed forces. They may also be responsible for security and the police force;
- ◆ Education and higher education – schools, universities, standards, academic staff;
- ◆ Employment – jobs, employment development, standards and obligations;
- ◆ Energy – electricity, gas, oil, etc.;
- ◆ The environment;
- ◆ Industrial relations – the arbiter between organised labour and employers;
- ◆ Exports – business promotion and facilitation;
- ◆ External relations and/or foreign affairs – the nation’s gateway to other countries, including ambassadors and representatives, delegates to international agencies;
- ◆ Finance, budget and customs and the revenue raising activities of government;
- ◆ Health;
- ◆ Immigration, which may include visas, passports and some supervision of the nation’s international borders;
- ◆ Internal Revenue, often used for income tax and VAT administration;
- ◆ PTT (Posts and Telecommunications);
- ◆ President/Prime Minister (see Cabinet Office);
- ◆ Science, research and development – the promotion of science in industry and academia;
- ◆ Security – internal security, intelligence, counter terrorism, police, etc.;
- ◆ SME, Small Business – the development of small and medium enterprises within the national commercial infrastructure;
- ◆ Sport – the promotion, regulation and administration of sport;
- ◆ Social Services – pensions, payments and services for individuals covered by the appropriate legislation;

- ◆ Trade, industry and industry development – focuses on assistance to selected industries deemed to be strategically important;
- ◆ Training, generally aimed at upgrading skills and increasing participation in the workforce;
- ◆ Transport – road, rail, sea, air, river, canal and lake. Covers access and carriers;
- ◆ Treasury – the custodian of the nations wealth and protector of the currency;
- ◆ Tourism – promotion and development;
- ◆ Youth – facilitating the transition between education and work, and assimilation into adult society.

It must be remembered that these functions are only identified within the context of a discussion of electronic commerce in government. They do not refer to any particular country. Many of them will be seen as overlapping. Many may also be seen as irrelevant to some countries. But the point is that the government has responsibilities for these and, as we shall see, other areas. The growth in government responsibility and in citizens expectations is almost irreconcilable. That is why government transformation, with a heavy dependence on technology, is so important.

Government businesses, agencies and commissions

In addition to ministries and major departments of government, it is likely that the government operates a variety of commercial enterprises, run either as not-for-profit or normal commercial enterprises. They may have been set up as a Government Business Enterprise (GBE) or a State Owned Enterprise (SOE), or as a publicly owned joint stock company, where all the shares are owned by the government in trust. It might also be a normal privatised enterprise with majority or minority holdings held by the government.

However, it might be none of these things. It might be set up to conduct government business in a commercial manner, in order to provide better service and to generate government revenues. It might just be to provide better access to government services at no charge.

It might also be to fulfil a statutory requirement in a business-type setting.

All of these categories, and others, are included here (note that some of these facilities may be managed at the regional or local level):

- ◆ Airlines
- ◆ Airports
- ◆ Archives and records
- ◆ Armaments – manufacture, maintenance and storage

- ◆ Audit Office
- ◆ Broadcasting
- ◆ Cargo handling
- ◆ Central/Reserve Bank
- ◆ Companies and securities offices
- ◆ Courts and judiciary
- ◆ State owned farms and agricultural/horticultural operations
- ◆ Gas production and distribution
- ◆ Housing
- ◆ Human rights and equal opportunities
- ◆ Government Information Technology
- ◆ Laboratories, research establishments, standards, weights and measures
- ◆ Libraries and museums
- ◆ Maritime operations
- ◆ Mines and mineral exploitation operations
- ◆ Oil and petroleum extraction, refining and distribution
- ◆ Parks and leisure facilities
- ◆ Police
- ◆ Ports and harbours
- ◆ Post Office
- ◆ Government procurement
- ◆ Government property and real estate
- ◆ Rail track, railway operations and rolling stock
- ◆ Regional development
- ◆ Religious affairs
- ◆ Roads and bridges
- ◆ Shipping lines
- ◆ Sports teams, facilities and institutes
- ◆ Statistics
- ◆ Telecom network and facilities
- ◆ Telecom operations
- ◆ Transport and storage
- ◆ Water and dams
- ◆ Wheat, foodstuffs.

There are clearly economic and political considerations concerning exactly which of these operations are set up and allowed to run with a degree of autonomy varying from tight government control and direction through to autonomous and independent operation. The majority of these types of operations generally operate outside day-to-day government control. They naturally have to operate within certain guidelines, budgets, and policies but, apart from that, are usually left to run the business themselves by local management.

The state owned enterprise must stay competitive to survive so that market forces can be considered the major factor in their adoption of technology, except where government has to provide the funding. In the case of Ministries and key departments, it is not that simple. The commercial imperative is often cloaked by bureaucratic processes.

Communicating with government

Every individual, every company, every agency and many external authorities need to communicate with the government at some stage throughout the year. Some require regular communications, others only communicate once or twice a year, or perhaps even less frequently for such services as passports. But as the complexity and the scale of government increases, so does the need for communication with government (see Fig. 7).

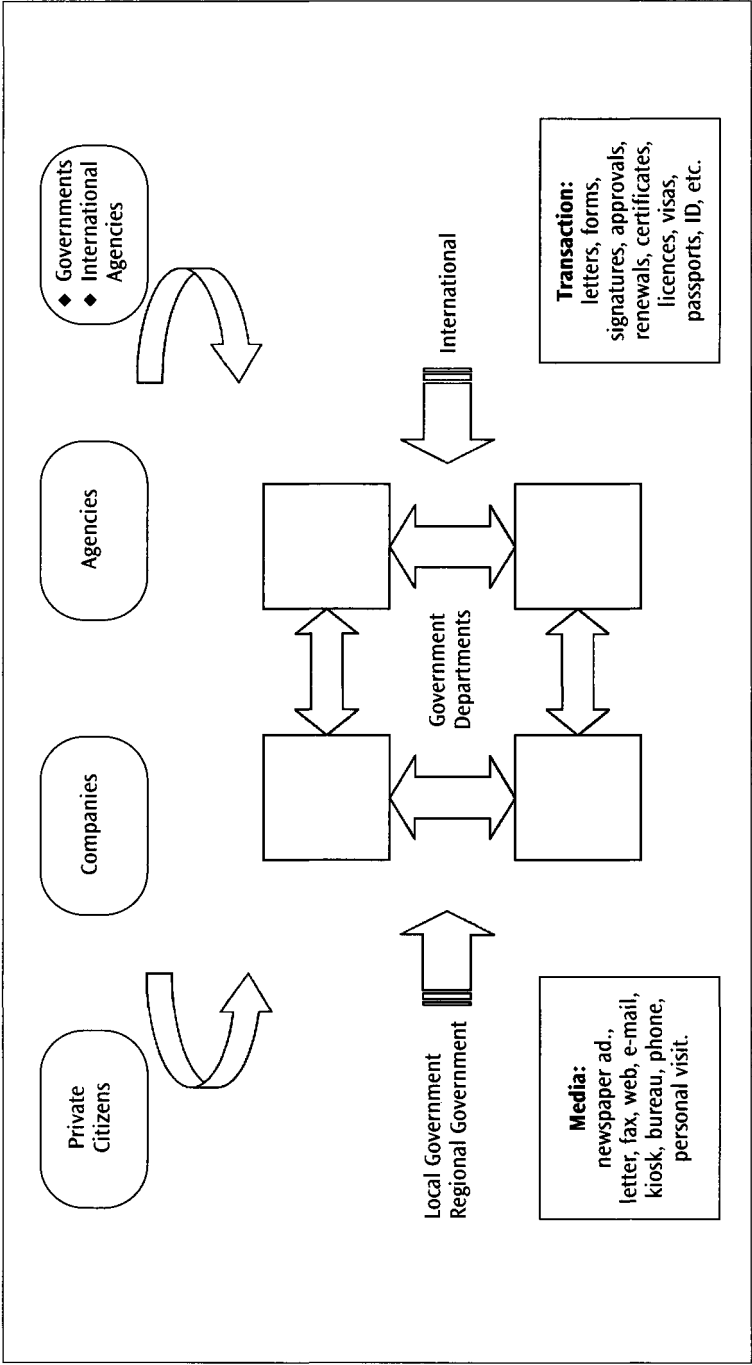
Referring to the lists of government departments or agencies, there are at least 97 different organisations listed. Many of them will have sub-organisations, regional offices and perhaps deal, in different languages, with a multiplicity of forms. Each organisation will need to communicate in person through telephone or personal visits, through faxed information, possibly even through e-mail. They will advertise their services and important information in newspapers, magazines, on radio and television, even on posters and the side of buses and taxis. There are also a range of government publications.

In addition to personal communications there are enquiries via post, telephone, fax and telex from companies, other agencies and community groups, overseas businesses and organisations, and from other governments and international agencies. The amount of paper used in dealing with the government is staggering. Government is often the single largest user of the postal system. And postal volumes are still growing at a global average of 3 per cent compound each year. Some of the largest users are Health, Social Services, Taxation, Immigration, and Economy, Trade and Industry. A few simple examples are health systems, taxation, immigration and international trade.

Health systems

We all have to see a doctor on occasion. For each visit he/she updates medical records and probably writes a prescription-in a multi-copy form. He/she also completes medical benefits forms, as does the patient at a later date. The doctor may also write referrals to a specialist. Payments may be made directly, or through a benefits system, which in itself is a major administrative undertaking.

Figure 7. Communicating with Government



Following a visit to the doctor a patient may go to a pharmacy to collect prescription medication, which results in the pharmacy entering prescription details into their system, retaining a copy of the doctor's original for their files and possibly sending another copy to the regional or national health authority. It also produce labels for the medication. Each transaction in a pharmacy means that it has to update its stock records and possibly its special records for dangerous or proscribed drugs. It also has to update its medical benefit records and send details to the local health administration/authority, which in turn maintains and controls central data bases.

A visit to a doctor may result in a stay in hospital. Hospitals are possibly the biggest hotel/accommodation/catering and transport organizations in the country. They have all of the administration that goes with running such large and complex organisations. In addition, they need to operate accurate and sophisticated stock control and inventory management systems for those most expensive of products – drugs and medical supplies.

They also need booking and reservation systems for beds and hospital staff, including specialist medical staff. They need to book special facilities such as operating theatres and recuperative facilities. They need to make available the correct diets and food portions. They must accurately identify each person in the hospital at all times, from the newest baby to the most elderly patient to all staff. The convalescence and after-care process is equally complex, in some ways more so because it may depend on home visits and treatment by peripatetic medical staff. This apparently simple process of healthcare absorbs as much as 12 per cent of GDP in some advanced economies, and this figure is rising. Any inefficiencies, delays or mistakes can be extremely expensive, with even more expensive multiplier effects.

The paperwork and inter-personal communications involved in dealing with healthcare systems constitute a significant proportion of healthcare costs. Current UK forecasts indicate that, after all paper is eliminated from the system and substituted by electronic messages and communications, healthcare will represent 25 per cent of all electronic commerce messages. This same electronic commerce process is variously estimated, particularly in North America, to save as much as 20 per cent of the total cost of healthcare, not just through the elimination of much of the paper but through better inventory management and use of resources through accurate scheduling and management.

Taxation

In some form or another we all pay tax, directly through income tax and company/profit taxes, or indirectly through value added or sales taxes. In

fact, there may be many, even hundreds, of taxes levied at a local, regional, or national level, but we are generally only aware of those we see, such as income tax and VAT.

The administration of any tax is both complex and labour intensive. The government needs to create and maintain accurate records for every individual and company in the country. Then it needs to assess taxation payable, either after a declaration of income or company results, or on individual transactions. Both methods need a taxation model devised after initial taxation legislation which is capable of great flexibility in order to accommodate frequent changes. The tax administration needs to be able to handle massive volumes of information and peak loads at certain times of the year. It needs sufficient staff to handle large volumes of queries, once again at certain times of the year. Above all, it needs to be able to handle large volumes of payments and refunds, notifications of taxes payable or refunds due, a large volume of correspondence, queries and a responsive face to the public, including walk-in bureaux facilities, and possibly kiosks.

As with the health administration, there is a massive volume of paper. Each piece of paper, telephone call, or fax involving a personal query takes time to resolve. Mistakes and volume cause a percentage of errors which are even more expensive to correct. The system has a built-in level of customer dissatisfaction, with consequent avoidance and policing systems, creating more costs and even greater levels of dissatisfaction. Expense, inefficiency and public dissatisfaction – a volatile mix for government, even more so for politicians.

Immigration

If anything, immigration systems are even more unpopular than taxation systems. For example, in applying for passports, visas and ID papers, people have to complete complicated forms, sometimes in unfamiliar languages. They need to provide photographs, birth certificates, marriage and other citizenship documents, prove qualifications, legitimacy of travel and so on. Then they have to visit a government office, wait in a queue, submit to interviews and then wait for lengthy periods to await the outcome and the required document. Refusal often occurs, without adequate, or any, justification. In some cases this even applies to visitors to the country.

The amount of bureaucracy, the potential for dissatisfaction, complaint, grievance and preference are all matters for concern. Once again, this is a costly, time-consuming, unnecessarily complicated system which is universally disliked. This process is often characterised as one of the least user-friendly experiences it is possible to endure.

International trade

Although less visible to the public at large, the process of obtaining approvals for imports and exports and then of obtaining access to, or release of goods through the import/export process is a cause of wide international concern. Importers and exporters, or their trade professionals, such as freight forwarders, shipping agents or customs brokers need to obtain a very wide variety of approvals from government before goods can move across borders. Many of these approvals, widely known as technical controls, have been put in place for historical reasons, such as industry protection, consumer protection, for religious or political reasons, for collection of statistics, and for a range of other reasons that have little relevance to current trading conditions. The World Trade Organisation (WTO) and others call these types of controls 'non-tariff barriers'. All nations have their own non-tariff barriers (NTBs) but they have been carried to excess in the past. Globalisation, WTO and EU accession rules, and other regional developments, are rendering many of them obsolete. In the meantime, they still exist. In one Middle East country recently studied there were well over 1000 categories of imported or exported goods that were subject to technical controls, many of them requiring multiple controls and approvals from several Ministries and agencies, plus Certificates of Origin from Chambers of Commerce and Certificates of Conformance (to standards) from external inspection authorities, not to mention 'legalised invoices'. In this particular case, there were 76 agencies requiring controls and approvals, each requiring signatures and stamps. The total potential permutation of controls amounted to over 11 million. And customs has to administer them all, which results in a very large number of physical inspections, which results in delays, and extra costs to traders – including bribery – and as much as 20 per cent extra on consumer goods at retail outlets. In this case, the average import took 11 days; the average export took 7 days.

Best practice import and export is measured in minutes today. These clerical, largely outdated practices add no value, but they do add costs, time, frustration and corruption to the trading system.

By replacing paper systems with a re-engineered electronic commerce based system a national penalty on trade can be replaced with a national competitive advantage, providing benefits to government, trade and the consumer.

Some examples of EC applications in government

The need for electronic commerce and for government systems and process transformation is a global imperative. Some governments have

made great strides, most particularly those with a large technology sector. But all governments can benefit

Healthcare

From the earlier scenario, imagine that the doctor, pharmacy and the hospital were all able to securely exchange information electronically. Imagine also that they could securely sign electronic documents. In this scenario, at some time in the future the patient will have a smart card which contains his medical records and electronic signature. All relevant information would be exchanged between primary, secondary and tertiary healthcare services across networks, in seconds rather than days or weeks. Any errors would be trapped by systems which are based on risk management profiles for patients, doctors and specialist staff, drugs and anaesthetics, ambulances, nursing staff, pharmacies, health benefits and so on. The risk management criteria are based on history of the individuals and processes and the likelihood of certain events taking place. When a certain level of risk is encountered it alerts experts to pay closer attention to the situation. Otherwise, all administration is removed from the critical path of healthcare. There is very little paper and few written signatures, if any. All filing and reconciliation is automated and exceptions reported by automated systems.

Hospital supplies and pharmacy supplies are replenished using electronic commerce techniques so inventory is reduced through JIT management methods.

Later developments will see the introduction of telemedicine, in which specialists can advise doctors in any area of the country, and indeed, any region of the world, by electronic commerce techniques. Similarly, home based recuperation and treatment can be achieved using similar methods.

Better quality of healthcare, less bureaucracy, more efficient service delivery with lower costs. This is the promise of electronic commerce. The benefits of this single group of applications can pay for the complete national electronic commerce infrastructure many times over.

Taxation/revenue enhancement

It is the dream of every tax official to maximise tax revenue and to eliminate tax avoidance. It is also a widespread taxpayer's desire to legally minimise the amount of tax payable, and then to defer payment. By using electronic commerce techniques each citizen can declare income and claim tax rebates using Internet service bureaux, tax agents or tax office bureaux to submit electronic declarations. In return, the tax authorities can guarantee payments of any refunds due within 14 days, transferred electronically into the citizen's bank account.

Of course, the citizen would need to be registered on the tax computer system and be authorised to submit electronic declarations to participate. Penalties for non-participation might also apply.

In order to determine the accuracy of the declaration, the tax department would need to build a model for a range of professions and industries so that their computers could automatically verify the likelihood of accuracy. They would build in risk management criteria to ensure that errors and exceptions are quickly adjudicated by experts.

The result of this sort of system includes enhanced compliance and participation in the national taxation scheme, and reduces taxes as a result. The costs of collection, validation, and exception and query handling is also much reduced, leading to greater levels of service and of accountability to both government and taxpayers. The same principles apply to all forms of tax gathering, for all taxes.

Immigration

By now, the picture for government electronic commerce applications is becoming clear. Completed forms (E-forms), electronically signed, are submitted to the government department when possible. The government department's computers perform risk management processing on the information submitted in order to validate as much of the information provided as necessary. Where original documents need to be sighted, they can be scanned in remotely, or deliberately waived if the risk management results fall within certain categories. In certain circumstances the physical inspection may still be necessary, but these can be minimized as a result of the risk management systems.

Completed documents can be printed and sealed in a local office or government bureau, for example a post office. Signatures/seals/chops can be represented by bar codes and other electronic devices.

Once again, accuracy, speed and client satisfaction can be dramatically increased, at lower costs. In this case, there is even a possibility of enhanced revenue generation since it will be possible to offer a range of optional services, for example premium for 1-4 hours, normal for 24 hours, economy for up to 5 days, etc.

International trade

The same techniques apply to that most complex of electronic commerce applications, international trade, involving customs clearance, port and harbour operations, shippers and trade professionals. The key difference here is that all of the participating government departments need to be electronically connected and to be capable of communicating electronically with all of the participants in the international trade cycle. Messages

need to be formatted to international standards; licences and certificates applied for and approved electronically. Customs clearance, involving all of the documents in use in international trade must also be submitted electronically.

The customs green and red channel processes can be re-engineered, with technological assistance, to reduce physical inspections down to less than 5 per cent of all consignments, perhaps less than 1 per cent eventually.

The results are less storage needs at ports and at customs, faster throughput of goods representing lower inventory and trader investment, reduced prices at the retail level, increased taxes and duty paid through greater compliance and, most of all, reduced-possibly eliminated-corruption. Compliance with WTO and EU rules for accession and more transparent trade are also valuable spin-offs.

Some other applications

The same principles of re-engineering, application of electronic commerce techniques and technologies, risk management and process to process automation can be applied to almost every area of government, whether it is in administration or in operating a government business enterprise. These include all the departments and agencies listed earlier, most particularly those with a heavy paper and administrative load, interactions with the public and the need for good levels of service. In particular they include:

- ◆ Publications and information
- ◆ Government procurement
- ◆ Education
- ◆ Tourism and leisure
- ◆ Transportation
- ◆ Statistics
- ◆ Social services and benefits
- ◆ Company formation, securities and company information
- ◆ SME and business development.

A final point – all of these applications are already in productive use in various government and public sector environments in several countries. They are not hypothetical examples. Electronic government is no longer theory; it will become a requirement for all modern administrations early in the twenty-first century.