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AUTHOR Bryson, Jo
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ABSTRACT

This paper provides an overview of the forces shaping the future of the knowledge economy and society, including: the speed and type of change that is occurring; the technologies that are propelling it; the technology and information choices that competitors are making; which organizations are in the lead; who has the most to gain and to lose; the investment strategies of competitors vis-a-vis the trends; and the variety of ways these trends may influence customers' demands and needs. The characteristics of a global information economy and society are identified, focusing on the four building blocks of infrastructure provision, lifelong learning, economic growth, and service delivery. National strategies for Singapore, the European Union, and Australia are considered, as is the role of libraries and information services in the global information economy and society. (MES)

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Proceedings

Building a Knowledge-based Economy and Society

Jo Bryson

Introduction

The world is witnessing a phenomenon, the effect of which is similar to, the industrial revolution and the invention of the printing press combining at the speed of sound. Information, transformed into shared knowledge and intellectual capital, is changing the face of work, education and every other aspect of life. Its effect is felt in changing business relationships and global markets, leading to a new form of co-competition, co-operating with the competition; and in profound transformations of industry structures and international cartels. It is also to be found in the intersection of changes in technology, regulation and demographics. This phenomenon is both the cause and effect of the global information economy and society.

This paper provides an overview of the forces shaping the future of the knowledge economy and society, it identifies its characteristics and explores four building blocks; infrastructure, opportunities for lifelong learning, economic growth, and service delivery.

National strategies for Singapore, the European Union and Australia are considered, as is the role of libraries and information services in the global information economy and society.

Understanding the forces that are shaping the future of the knowledge economy and society.

After centuries of lying dormant, information is now considered to be a wealth generator, not just in terms of contributing to economic performance of the organisation, but as a major contributor to new service-based and knowledge based industries. The information society now creates one out of four new jobs and the number of job vacancies is increasing. Global e-commerce will reach between \$3.2 to \$5 trillion by 2003, which is between 5% and 7.2% of world trade.

The questions for librarians, information or knowledge professionals is 'Do you understand:

- How fast this trend is emerging in different markets around the world?
- What are the likely impacts?

To answer these needs a knowledge and understanding of:

- The type of change occurring;
- The technologies that are propelling it;
- The technology and information choices that competitors are making;
- Which organisations are in the lead;
- Who has the most to gain and to lose;
- The investment strategies of your competitors vis-a-vis the trends; and,
- the variety of ways these trends may influence customers demands and needs.

The winners will be those who are willing to devote the time and intellectual energy necessary to understand and influence the forces that are shaping the future of the knowledge society.

The speed and type of change that is occurring and the technologies that are propelling it

An example of the forces shaping the future of the global knowledge economy and society is the

Internet and Wireless Application Protocol (WAP) technology. The number of Internet users globally is now around 190 million and will reach 250 million by the end of this year. Yet within four years more users will be accessing the Internet through mobile technology than on fixed-lines. The take-up is predicted to be that by 2001, the number of mobile phone users will be double the number of PC users worldwide. Other estimates suggest that there will be 100 million PCs and 400 million wireless devices worldwide next year. By 2002 there will be one billion wireless subscribers. In 2003, despite the world having 500 million Internet users, mobile commerce will overtake fixed e-commerce, with most mobile calls being made to databases not to people. By 2005, 500 million WAP handsets will be shipped. Yet despite this hype and growth, a significant proportion of the world's population have never heard the sound of a dial tone. Such are the disparities of the global knowledge economy and society.

Apart from size and speed, an interesting feature of this trend, is that it is Europe and Asia, not the US or Australia, that will be the driving force behind the next generation of wireless mobile commerce services.

The technology and information choices that competitors are making

A second interesting feature is that this is not a telecommunications or technology issue, it is a content issue, and therefore one in which the skills of librarians, information and knowledge professionals can play a part. By this, it is meant that the technical know-how is in place, but the mainstreaming of the application of the technology to the consumer marketplace is dependent on there being content-rich services.

The successful companies in this market space will be those that can differentiate their services from others in terms of personalised, localised, specialised, customised services. This means databases that are rich in information that can be manipulated to provide individualistic services, in the language of choice, 24 by 7, customised to the individual and the exact polling location of the mobile phone. As an example:

- Transactions - customised information on stock trading shifts and latest floats relevant to their portfolio investments, proactively delivered to their WAP phone, enabling them to buy or sell at the push of a key;
- Database - theatre and restaurant guides on request, tailored not only to meet their cultural and culinary tastes, but also delivering information on the two closest theatres or restaurants to the cross street they are standing on anywhere in the world. At the push of a key a reservation can be made, and a menu selected;
- Recreation - latest updates in scores of a favourite tennis champion, football or rugby game, as well as a host of wireless games such as hangman to play on the WAP hone whilst waiting in a queue, for a friend at the wine bar, or for the train;
- Information - news and weather updates, tailored to the location of the phone, or its home base; and,
- Mobile office - mail, calendar, contact numbers and other information available anywhere, anytime.

Which organisations are in the lead and who has the most to gain and lose

Mobile commerce is seen as Asia's opportunity to leapfrog the United States in the global information economy in e-commerce and global business. For a variety of reasons, the take-up of e-commerce has been slow in countries such as Japan. This trend is being reversed in the mobile commerce environment as Japan is being used as a test bed. Its flagship, DoCoMo, (Do Commerce Mobile) by mid this year had 13,000 sites, 20 search engines and 7 million subscribers. People are willing to pay for content if it is tailored specifically to them. In Japan people pay to play interesting games that, when they win, can be exchanged for loyalty points. An example is wirelessgames.com, which experienced 35,000 plays on its web site in the first six weeks of its operation. It now has 70,000 games, increasing by 4,000 per day. It employs aggressive marketing techniques, such as competitions, to keep its top games people logged on. It is a prime

example of how organisations with intellectual capital not physical capital will prosper in the global information economy.

Mobile commerce is about strategic alliances between the telecommunications companies who see WAP applications as a cash cow in the use of their networks; intermediaries that package together and customise the offerings to the consumer; and the content providers who develop the games. This is a symbiotic relationship in a vertical market where profits are shared 10% to the telecommunications company providing access; 40 - 70% to the packaging companies; and 20 - 50% to the content developers.

The manner in which these trends will influence customers and service delivery

The future will be a multi-network, multi-device environment delivering a quasi-infinite variety of interactive databased services over IP. In addition to wireless technologies, access will occur through digital TV set-top boxes, digital assistants and consumer appliances such as microwave ovens, refrigerators, and in-vehicle devices such as road navigation systems. NTT estimates that by 2010 only one-third of their customers will be people, the rest will be cars, bicycles, portable PCs, boats, vending machines, and even pets. The change is illustrated by the fact that Microsoft is changing its mission statement from 'a computer on every desk and in every home' to 'empowering users with great software any time, any place, with any device'.

Characteristics of a global information economy and society

A global information economy and society is one in which:

- Distance poses no obstacle to economic development, social intercourse, learning, voluntary action, adequate health care, business success and full participation in society;
- Knowledge is increasingly available to everyone, packaged in a manner to meet individual social, literacy and cultural needs, allowing everyone to make wiser decisions in all aspects of life; and
- Everyone is not just a consumer of knowledge and content, but also a creator.

It is a challenge that is global in nature. The issues of the digital world possess transnational implications. It entails the creation of an international environment in which:

- Sufficient infrastructure is in place to meet needs regardless of location. This is not just a matter of the proximity of physical and virtual components of the infrastructure, but also a matter of choice of infrastructure to suit means, as well as one that is affordable, reliable and of quality;
- Individuals, no matter what the political regime, are aware of knowledge sources and skilled in determining and satisfying their information needs;
- There is recognition by governments and organisations that knowledge contributes to individual well being, societal and economic growth. This recognition is translated into action when new models for lifelong learning are encouraged;
- Knowledge-based service industries form a significant proportion of GDP and there is a reliance on knowledge technologies to foster business competitiveness, economic and employment growth;
- Private sector investment and innovation capacity is a key driver in economic policy;
- Public sector activities compliment this by setting the example in electronic service delivery; in delivering health and education programs, in enabling rapid and electronic access to information, personnel and services; and
- There is worldwide mutual recognition and multilateral agreements that support consumer, legal and security arrangements. This includes an internationally compatible light-touch legislative framework to manage privacy, access, consumer protection, authenticity, security, and protection of intellectual property rights in the electronic environment, as well as effective security and authentication mechanisms to engender trust and consumer

confidence.

These characteristics can be grouped into four building blocks:

- Infrastructure provision;
- Lifelong learning;
- Economic growth;
- Service delivery.

Infrastructure

In a perfect state, an information economy and society is one where there is ubiquitous and convenient access to content rich sources from anywhere. Anywhere could mean from the home, car, school, workplace, or the wide-open spaces of outback Australia or Outer Mongolia. The access point, or infrastructure may be:

- Physical - such as a library, community access centre or telecentre; or,
- Virtual - such as the Internet through a WAP phone, or using the world wide web, regional portal or a vortals from a PC.

Access to what constitutes the information economy and society still remains closely linked to wealth, education and employment. For many people, even in countries and regions where there are high standards of living, the main route of access is still the workplace. There is also a lack of awareness with those who have the most to gain, notably the elderly, the unemployed, and the handicapped and disabled.

Whilst the industrial revolution caused massive displacement of people to the cities, the knowledge revolution is causing a massive displacement between those who have and understand their access to the global information economy and society, and those who do not. This is felt even in Australia. At the top end of the social ladder, access to infrastructure allows for a 'seachange' enabling people to move away from the cities back to a more preferred lifestyle in a rural area whilst still enjoying a generous income. It also provides the hope in slowing the drift of youth from rural towns to the cities and in reversing the consequential demise of rural Australia by engendering new work opportunities such as call centres. However, regional disparities are still very marked and in remote and very remote areas, price and lack of reliable wide band communications are still significant barriers to entry to the information economy and society.

Isolation factors can be assessed on geographical, safety, sociological and economic grounds. Access to quality and reliable broadband voice and data services is as important as income, personal mobility and attitude in overcoming the social and economic difficulties experienced in rural and remote communities in Australia and elsewhere in the world.

Opportunities for life long learning

The presence of infrastructure alone does not constitute the solution to access to the information economy and society. Individuals are faced with a multitude of information outlets and need the skills and understanding of how to use these to best advantage. Work, social communication, and the ways in which these and the quest for information are carried out, have all changed significantly in the past decade. Changes in the work and social environment also mean that people must learn constantly and differently to adapt and progress. Learning is no longer limited to formal education; it is part of the experience of life.

The learning environment that is necessary to cope with the lifelong challenges associated with constant changes in technology and the social and economic environment, must in itself be lifelong. Lifelong learning will be essential to individuals in a knowledge economy and society, as finding and keeping jobs will depend upon access to learning opportunities to upgrade skills and knowledge throughout their lifetime. The lifelong learning experience will also include the need for an awareness of the opportunities for social, cultural and personal development arising from these

changes in the technology, social and economic environment.

Access to relevant information is not the only panacea. Individuals will need to acquire new abilities in identifying personal needs, locating information sources, and, discerning an appropriate level and content to suit their particular circumstance. A third dimension, is the requirement that the learning experience is culturally relevant, as well as being relevant to experience and age. In all of this, there is a place for formal education institutions, as well as an emphasis on learning beyond the classroom in venues such as libraries, professional associations and self-teaching situations. As an example, the latter can be achieved by borrowing the book 'Internet for Dummies' from the local library.

Economic Growth

The base line in creating opportunities for economic growth in the global information economy and society is in creating a trusting and confident trading environment. This has to be achieved both at the level of individual solutions as well as at the level of the infrastructures supporting these solutions. The focus must be global and focus on:

- Scalable and usable authentication infrastructures, including electronic signatures and/or biometrics;
- Security architectures, including smart cards;
- Protocols and transactional models, including electronic payments;
- Metadata standards, to characterise and assist access to quality information;
- Personal rights to empower users, including privacy, confidentiality, copyright;
- Technologies and systems to fight abuses, fraudulent or criminal activities.
- Light-touch legislative framework, to manage privacy, and protection of personal data, access to personal and government information, preservation and management of public records, consumer protection, authenticity of electronic transactions, admissibility of electronic signatures for legal purposes, security, and protection of intellectual property rights; and
- Effective security and authentication mechanisms to engender trust and consumer confidence, including electronic signatures, accredited certification authorities and electronic certification services that can be liable for damages should they act negligently in implementing certification, signature creation or verification.

Once this trusted environment is in place, it then becomes easier to attract new industries and diversity, assisting industries towards an information and service based economy.

Service delivery

Economic commerce and online service delivery are key drivers in the reduction of time-consuming and costly bureaucratic processes in both the public and private sectors. Governments and the private sector are working to:

- Provide more efficient services through seamless access to information and services eliminating the business to business and business to consumer boundaries and associated delays in processes;
- Provide better customer relationships through the electronic delivery of a wide range of services including lodgment of forms, applications and registrations, seven days a week, 24 hours a day;
- Ensure a choice of service delivery mechanisms such as the Internet, telephone, call centres and one stop shops;
- Target specific community needs for the delivery of online services; and
- Create competitive and productivity advantages through the elimination of paperwork where possible and delivery of more efficient supply chains such as electronic procurement and

tendering.

Technology provides the means by which new products and services can be made available to locations that have traditionally been difficult to reach. Regional and remote areas will have a renewed focus as the new technologies mean that service delivery to these areas becomes possible in a cost-effective manner.

This new environment will also present challenges. It is significant that the global economy now means that threats to business can come from any part of the world.

National Strategies

Australia

Growth in the use of the Internet and home computers in Australia is rising steadily. Over half of all Australian households (54% or 3.8 million households) had a home computer and one third (2.3 million households) had home Internet access by May 2000.

This compares to May 1999 where 47% of Australian households (3.2 million) had access to a home computer while 22% (1.5 million) had home Internet access.

An estimated 6.4 million adults (46% of Australia's adult population) accessed the Internet in the 12 months to May 2000 compared with 5.5 million adults (40%) in the 12 months to May 1999.

Take-up of e-commerce is slow when compared with the United States and Europe. Only 6% of Australian adults (802,000) used the Internet to purchase or order goods or services for their own private use in the twelve months to May 2000. Books or magazines, computer software and music remain the most common goods or services purchased for private use.

In Australia, the Online Council of Ministers is considering a number of strategies to position Australia in the global information economy and society. These include strategies for a co-ordinated and seamless approach to local, State and federal government electronic service delivery, legal and regulatory issues, engendering confidence in the use of government online services, privacy and security issues, a national approach to public key technology, intellectual property, strategies to overcome IT & T skills shortages, IT & T industry development, regional e-commerce issues, use of datacasting for government service delivery and affordable telecommunications services to rural and regional Australia.

Singapore

Singapore, through the Infocomm Development Authority of Singapore (IDA), is spearheading a drive to be a vital global information centre. The IDA's role is in catalysing Singapore's transformation into a knowledge-based digital economy to realise the benefits of the digital future. The Singaporean strategy is an example of government leading by example combined with free market development.

Singapore was quick to realise that people's openness to and skills with information and its related technologies could offer a distinctive competitive edge to the country. The IT2000 Masterplan has been largely implemented. It provided the blueprint for the use of information technology in nearly every government department. It also enabled a broadband infrastructure of high-capacity networks and switches throughout the 'intelligent island'. The ICT21 Masterplan now takes planning to the year 2010.

Government services either planned or operating include:

- Internet-based government procurement, including a one-stop, round-the-clock centre for the government's business dealings;
- Integrating the financial systems of ministries and agencies and the procurement applications;

- Housing rent and mortgage payments online;
- Global change of address and electronic application forms for the telephone, utilities, television licence and parking; and
- A single, comprehensive government web portal to proliferate the use of technology and create a technology-savvy community.

All agencies have to adopt a common infrastructure and common modules for form-filling, payment and security in order to achieve a single, consistent user interface. The user interface also equates to a citizen journeying through life. These cover business, defence, education, employment, family, health, housing, law and order and transport. Many link the functions of one agency with another, providing a seamless interface for the user.

European Union

The development and effective uptake of information and knowledge-based technologies is a **key issues for the European economy**. The European Commission, through an extensive and integrated policy, aims to foster the emergence of the information society in Europe. Its information industries have become one of biggest and fastest growing sectors in the EU. They are creating new jobs, new business opportunities, new products and services.

In addition to telecommunications deregulation and the development of an appropriate regulatory framework, e-commerce is one of the lynchpins of the Commission's strategy. E-commerce, consumer protection and data protection Directives complement work on issues such as the treatment of unsolicited commercial communications via e-mail and the determination of the moment when an online contract is concluded. Other key Directives concern:

- Copyrights and authors rights in the information society;
- The creation of an harmonised EU-wide framework for electronic signatures and electronic certification services; or
- A horizontal Directive which aims to remove the remaining obstacles to the free movement of electronic services, in particular regarding the establishment of service providers, the provision of commercial communications, the treatment of electronic contracts and the liability of intermediaries.

Other areas that the European Union is addressing in the global online environment include:

- Liability, especially in the area of Intermediary service providers;
- The processing of personal information on the Internet;
- Intellectual property rights and copyright protection in the new environment, especially reproduction rights, the communication to the public right, distribution rights, and the legal protection of anti-copying and rights management systems;
- Taxation and tariffs on a product ordered and delivered through the Internet;
- Encryption;
- **Promoting the safer use of the Internet**, especially in combating illegal and harmful content on global networks whilst not having a disproportionate impact on Internet users and the industry as a whole; and
- Promoting and protecting consumer confidence and rights on the Internet.

The European Union is also fostering collaborative R&D projects, to bring together researchers to develop new technologies for the next generation of e-commerce products and services. There is a strong **emphasis on the take-up of R&D results**. This includes actions supporting the development and diffusion of new methods, techniques and the associated skills required.

Implications for Libraries

In a fast moving world, the question is 'do libraries need to reinvent themselves?'

Traditionally libraries were the gatekeepers to information, knowledge and learning. Their roles were described in terms of being the custodians and organisers of the cultural and intellectual record. Professional aims centered on safeguards of equality of access and managing and preserving the heritage in past and present records for the future. In the knowledge-based economy and society, libraries will have to integrate themselves into the multiple-delivery channeled networked society.

New partnerships may be introduced between content providers in the mobile commerce marketplace, database vendors, document delivery agents and publishers of electronic documents. By forming alliances and recognising that variety and choice is good, new content rich services, offering ubiquitous access can be developed to meet the needs of individuals, organisations and communities in the global information environment.

These activities will be necessary in order to meet the multi-faceted demands of the different types of user encountered within future organisations. Delivery will use multiple formats, including video streaming and sound bites to various locations including the motor vehicle, mobile desktop, and web television in the home. Libraries will add to the distribution channels, not replace them.

The 'book' of the future will not necessarily be in the mass-produced paper form that we know today. It will be downloaded via a machine that is a cross between a copier, a jukebox, a LCD machine and credit card reader. People will be able to select articles from professional journals, the Internet, chapters from books and other material, customised according to their need. The powers will not only be in the knowledge of what is in the final 'book', but also in knowing what is available, where and how to find it.

The value proposition will be in using multiple delivery channels to add value by personalising, localising, specialising and customising services. Library skills in organising and describing information also make the profession ideally suited to playing a major role in various metadata initiatives that are re-defining information storage and retrieval activities. The ability to weave information and knowledge into flexible and adaptable structures will be a further key to keeping the library and information service in a competitive position.

Librarians can also be key players in the learning society, that is, in supporting life-long learning. They can provide access to information and communications technology, provide advice and guidance. To be most efficient and effective they need to link with other institutions in the education field to build a network of learning centres and local strategic partnerships and plans.

They will have to develop new economic strategies, better understand user needs and demands, develop skills of staff and users and develop new services. The research priorities will lay in the field of integrated access to distributed and diverse resources, large repositories, preservation and access strategies. Strong political and advocacy skills will be required to assist libraries and information services meet these challenges and opportunities in the global information environment.

In order to retain their current customers, librarians and information and knowledge professionals will need to find the answers to the following propositions:

- How to engage with customers to maintain market position or loose it;
- How to develop trust relationships with customers;
- What is offered to customers that others do not - what is unique that keeps the customer in the service's market space and is not lost to others;
- Where is value added - in personalised, localised, specialised, or customised services; or
- What is needed to further enhance this.

Conclusion

The future for libraries and information centres lies in the following propositions:

Reality acknowledges that - when a person or organisation ceases to grow it starts to die.

The question is, what are the fresh inputs in terms of funding and ideas that will prevent starvation, withering and death?

Libraries and information services that create the future will do more than satisfy customers, they will constantly amaze them.

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