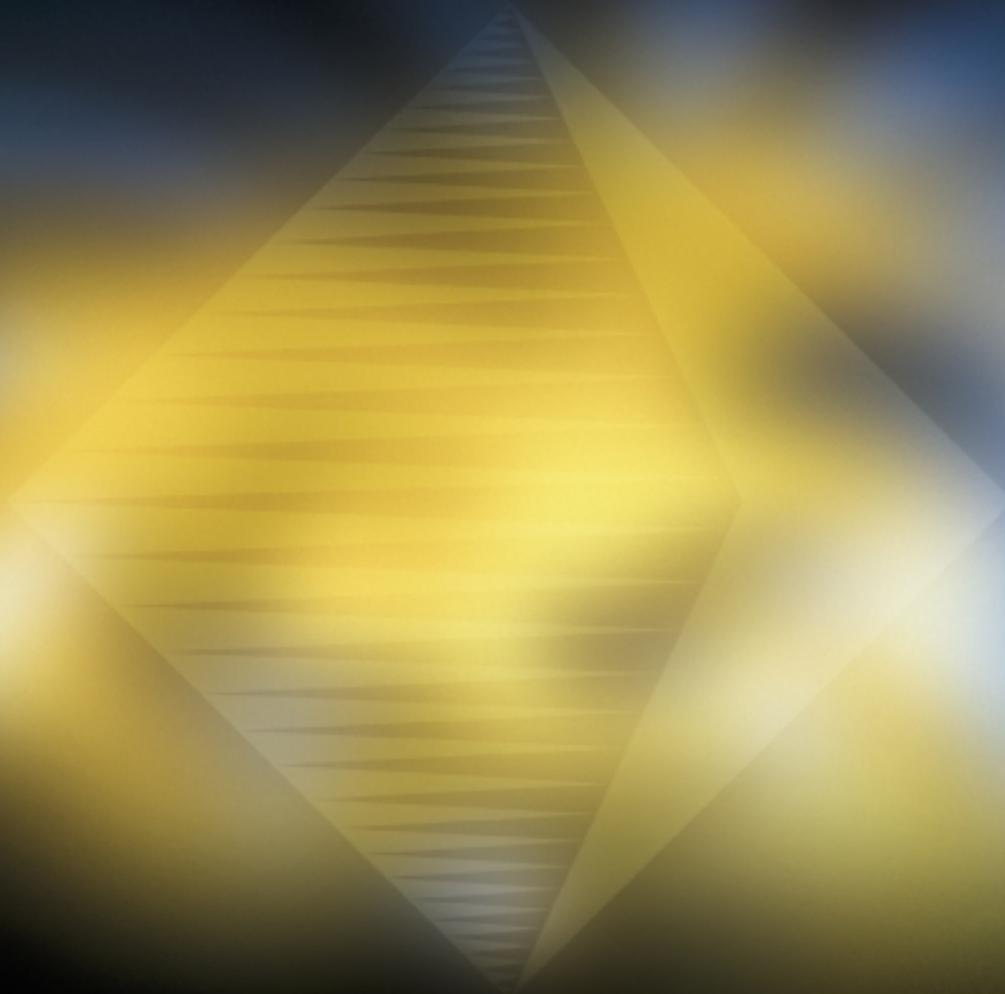


eBusiness:
Where Are We and
Where Do We Go From Here?



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Foreword

'eBusiness: Where Are We and Where Do We Go From Here?' is a contribution to understanding the evolution of eBusiness, the current environment for eBusiness in Ireland and the next steps towards making Ireland a global leader in eBusiness.



This report presents the conclusions of a benchmarking process initiated by Forfás at the request of the Department of Enterprise, Trade and Employment. It assesses the development and potential of eBusiness, outlines the policy responses of other countries and the requirements for a business environment in Ireland conducive to the promotion of eBusiness activities. It makes recommendations for Government Departments, for the development agencies and for enterprise.

Much progress has been made in recent years. The Government has set the target of making Ireland a global leader in eBusiness, and is actively developing the building blocks for the digital economy. These initiatives provide firm foundations on which to accelerate the adoption of eBusiness and to improve overall competitiveness.

With the slowdown in the technology sector, eBusiness has not developed as quickly as anticipated by firms, by the financial markets or by governments. Despite the slowdown, eMarketer, an Internet consultancy firm, estimates that worldwide eBusiness revenues will grow to €2.37 trillion by 2004, from €474 billion in 2001. It is critical that the downturn in the world economy and technology markets, which has dampened the hype surrounding eBusiness, does not lead to complacency on the need to develop an eBusiness economy as the future impact of eBusiness will transform business priorities.

The exploitation of eBusiness has the potential to enhance competitiveness, at the level of the firm and nationally through its impact on productivity. eBusiness reduces transaction costs, increases management efficiency, and can increase competition in all markets. Research carried out by Accenture Consultants for Forfás, however, indicates that the enterprise sector is not yet making optimum use of eBusiness for competitiveness. For example while almost all enterprises are connected to the Internet, less than a third are using eBusiness processes in ordering and supply activities.

eBusiness also gives rise to new opportunities for wealth creation in emerging sectors of the digital economy. For example, in the emerging areas of digital media and digital content management Ireland has the potential to develop a leadership position by building on existing strengths in areas such as software development, content creation, financial services and customer support.

This report outlines key priority actions to further improve the environment for eBusiness, to accelerate adoption of eBusiness by the enterprise sector and to further promote Ireland as a base for mobile investment in eBusiness related sectors. These are some of the achievements to date and proposed actions:

- ▶ *Ireland compares well internationally in the development of eGovernment services for businesses, with the implementation of initiatives such as Revenue On-Line Service offered by the Revenue Commissioners. Government should continue to take a leadership role by accelerating progress on eGovernment, particularly on the development of eProcurement and ePayments systems. The objectives should be to generate greater efficiencies within Government, and to encourage all businesses to interact electronically with Government;*

- ▶ *The Government has enacted a number of critical Acts to underpin eBusiness development including the Electronic Commerce Act 2000, the Copyright and Related Rights Act 2000 and the Communications Regulation Act 2002. Ireland should now provide an overarching legislative and regulatory framework for eBusiness and in the context of the development of the knowledge economy to ensure appropriate protection for on-line intellectual property;*
- ▶ *Ireland has made major investments in national information infrastructures, including international telecommunications connectivity, Internet data centres and other support services. Accelerating a rapid and comprehensive broadband build-out is required to facilitate Irish businesses and citizens to fully utilise these investments;*
- ▶ *The Government has allocated substantial additional investments to third-level IT skills provision, which has led to the initiation of a range of eBusiness courses at diploma, degree and postgraduate levels. All graduates should have an awareness of eBusiness and the required mix of business, creative, and IT skills should be provided by the third level education sector;*
- ▶ *Ireland should seek to establish a leadership position in emerging areas such as digital asset management, mobile commerce and electronic marketplaces and supply management.*

Companies and countries that respond dynamically to the opportunities and challenges that eBusiness brings will secure a competitive advantage. Ireland is well placed to exploit these opportunities.

Martin Cronin
Chief Executive Officer

eBusiness: Where Are We and Where Do We Go From Here?

Preface

Background

The Forfás report, *eCommerce: The Policy Requirements*, prepared at the request of An Tánaiste and Minister for Enterprise, Trade and Employment, published in July 1999, recommended a process to monitor the development of eBusiness in Ireland.

Forfás, with the Department of Enterprise, Trade and Employment and the support of the Government's Information Society Action Fund, commissioned Accenture (formerly Andersen Consulting) to undertake this work.

A baseline report was prepared in May 2000, and was updated in October 2000, February 2001 and July 2001. This report is a composite document drawing on the material researched in the previous four reports and outlines measures for the future development of eBusiness in Ireland.

Aims

The aims of this process are to:

- ▶ *Monitor eBusiness development in key sectors¹ of the Irish economy, assess its implications and identify the opportunities, threats and the required actions for the successful development of eBusiness;*
- ▶ *Monitor and assess key environmental factors necessary for eBusiness development;*
- ▶ *Compare Ireland's environment for eBusiness growth and the performance of key sectors in eBusiness with those in leading countries, and to identify required actions for the successful development of eBusiness.*

Methodology

International data was sourced from Accenture practitioners in each of the comparator countries (US, UK, Netherlands, Singapore, Sweden, Finland, Norway, and Japan). Accenture research and knowledge bases were used as inputs, and extensive use was made of secondary research from Gartner, Jupiter Communications, IDC, and other organisations.

As part of the background research, Accenture and Forfás organised several consultative workshops with participants drawn from the enterprise sector, academia, various government departments and agencies. In addition, interviews were held periodically with sectoral experts and government officials to assess the sector-specific implications of eBusiness and its implications for Ireland.

This process has ensured that the review is based on the most up-to-date information in key sectors and on best practices in other countries, and will allow ongoing analysis to be undertaken on a regular basis, in order to monitor Ireland's comparative position.

¹ *The sectors analysed were Software, Electronics Hardware, Dot-Coms (Internet companies without a pre-existing offline presence), Non-Food Retail, Financial Services, Tourism, Education, Logistics and Fulfilment, Food and Agri-business (including Food Retail), Digital Content and Intellectual Property Management, Chemicals and Pharmaceuticals (including Biotechnology).*

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Executive Summary

1 The Global eBusiness Environment

Introduction

The past two years have seen considerable changes in the environment for eBusiness², in the technologies available and the way in which they are deployed. Some of these changes have slowed the pace of eBusiness development, and there have been some highly publicised business collapses. Coupled with a major stock market correction in April 2000, and the subsequent global economic downturn, some companies think that eBusiness is no longer an issue – that it can be ignored, and that business can go on as it always has gone on.

Such a belief is ill founded and dangerous.

eBusiness continues to be one of the major issues facing businesses today. How quickly they adapt, how well they adapt, and how flexibly they respond to changes in technology, in business relationships and in customer behaviour will determine their success, and indeed their ability to survive. The adoption of eBusiness is even more important for Irish businesses in a global economic downturn. Accenture analysis has shown that firms who use eBusiness effectively are able to generate revenue increases of 10% to 20% and cut costs by 20% to 45%. In an era when Irish firms will be facing an increasingly competitive environment, it is essential that they adopt eBusiness to cut costs and to drive revenues.

eBusiness Revenues

Despite the economic slowdown, worldwide revenues from eBusiness should continue to grow strongly. eMarketer, an Internet consultancy estimates that in 2000 worldwide eBusiness revenues were worth €318.6bn. Worldwide revenues are projected to grow to €3.5 trillion by 2004. eBusiness growth will be stronger in Europe than in the US, as Europe catches up. eMarketer forecasts that Europe's share of worldwide eBusiness revenues will grow from approximately 12% in 2000 to over 30% by 2004. The US's relative share will fall from 72% in 2000 to 56% by 2004.

Business-to-business (B2B) rather than Business-to-consumer (B2C) revenues account for the most significant element of eBusiness revenues. While much of the hype surrounding eBusiness was in the business-to-consumer arena, it is now clear that business-to-business eBusiness provides the greatest opportunities for the enterprise sector in Ireland. eMarketer estimated that the relative importance of business-to-business eBusiness will grow from 69% of total European eBusiness revenues in 2000 to 77% of total European eBusiness revenues by 2004. In the US, the relative share of business-to-business revenues will increase from 70% in 2000 to 88% of total eBusiness revenues by 2004³.

² For the purposes of this report, eBusiness is defined in its widest sense as including all aspects of business that takes place over networks such as the Internet. It includes goods and services that are delivered over these networks such as software and music, and goods ordered over the networks but delivered in some other way, such as personal computers. It covers the whole range of business functions required to support these activities from marketing to production to delivery and service and includes the hardware, software, content generation, telecommunications and support services that makes all this possible.

³ eMarketer, *The eGlobal Report*, 2001.

Business-to-Business

While most media attention has focused on companies that serve consumers, it is the use of eBusiness within and between companies that is of real importance. The use of eBusiness by companies to integrate their supply chains slashes transaction costs and offers companies real tangible business benefits. For example, the use of eBusiness in supply chain integration has led to inventory reduction of 25% to 60%, and lowered overall supply chain costs by 25% to 50%⁴.

Therefore it remains critical that the Irish enterprise sector continues to develop and implement eBusiness strategies to build on their eBusiness capabilities, and to seize on the real opportunities that information and communication technologies (ICT) offer to increase revenues and to reduce costs.

Internet Enabled Job Creation

By the end of 1999, Internet pure-plays⁵, portals, Internet access and application companies had created three million jobs in the US and 905,000 in six European countries covered by Spectrum Strategy Consultants research (France, Germany, Ireland, Italy, Spain, and the UK). In 2000, some 11,000 of the Irish workforce were employed in the Internet economy, and this was expected to rise to 30,000 by 2002⁶. Given the current slowdown in the world economy and particularly in the technology sector, the achievement of these targets may be delayed. However, the European Information Technology Observatory (EITO) projects that long-term demand for IT skills will remain strong.

Stock Market Corrections and the Global Economic Downturn

The most significant event affecting the development of eBusiness in the past two years is the stock market correction of April 2000, which set a trend for lower valuations for technology stocks. This caused, directly or indirectly:

- ▶ *A shift in investment emphasis from dot-coms to dot-corps⁷, and from pure-play Internet companies to software products firms;*
- ▶ *The spectacular collapse of a large number of dot-coms;*
- ▶ *An increase in merger and acquisition activity in the technology and Internet sector;*
- ▶ *Slower developments throughout the sector and among users.*

The European technology sector was seriously hit by capital rationing in the Telecommunications sector, due to the inflated prices paid by telecommunications companies for 3G licenses. The slowdown is, in large part, being driven by the proportionally greater exposure of European technology firms to the Telecommunications sector. The terrorist attack on the World Trade Center has accelerated the negative impact of these trends and sharply reduced business and consumer confidence in the US and Europe. The immediate impact has been a delay in investment decisions, particularly foreign investments and this has focused corporate attention on cost reduction. However, while information technology capital investment in Europe is projected to fall by \$50bn⁸, or 20%, in 2001, Accenture research highlights that leading companies are continuing to invest in ICT as a mechanism to increase revenues and reduce costs.

⁴ Accenture Research, 2000.

⁵ Pure-plays: this sector refers to "born on the web" companies, that is, companies which are set up on the Internet and do not have a previous offline presence – for example, Amazon.com.

⁶ Internet Enabled Job Creation, Spectrum Strategy Consultants and Andersen Consulting 2000.

⁷ Dot-corps: old economy companies that are developing eBusiness strategies.

⁸ UBS Warburg Research.

Change in the Rate of Adoption

Fears of a sustained recession in the US, the downturn in the technology sector, and the subsequent shift in investment interest from dot-coms (pure-play Internet companies) to dot-corps (existing companies who are using eBusiness) have begun to affect the adoption of eBusiness both internationally and in Ireland:

- ▶ *Large enterprises are taking a more considered approach to the implementation of eBusiness, since they no longer fear the loss of business to dot-com competitors;*
- ▶ *Irish SMEs are now adopting a wait-and-see approach to the adoption of eBusiness.*

Internationally, the highly publicised collapse of many dot-coms has reduced the perceived competitive threat from eBusiness. Increasingly, eBusiness is being regarded as a process that can make existing companies and Governments more efficient in how they manage suppliers, customers and internal business processes. Given the complexity of integrating eBusiness into existing business processes, many organisations are incrementally adopting eBusiness technologies in order to increase revenues and to reduce costs, though activity is not as apparent as in the dot-com era. However, Enterprise Ireland are noting a small but growing number of client firms that are successfully implementing eBusiness strategies.

Irish SMEs

Accenture analysis highlights that there is a growing digital divide between large and small firms in Ireland. In the eleven sectors benchmarked by Accenture, the lagging sectors tend to be dominated by Irish SMEs, except for the software sector and the chemicals and pharmaceuticals sector. Many Irish SMEs have become complacent as they believe that the adoption of eBusiness is:

- ▶ *Over-hyped;*
- ▶ *Less urgent now that the perceived competitive threat has waned;*
- ▶ *Will be cheaper and easier in the future as the available products and services improve and reduce in price.*

While SMEs compare relatively well to leading and competitor countries in terms of Internet penetration and having a web site, complacency is leading to the postponement of strategic planning and investment in eBusiness. It is critical that Irish SMEs respond dynamically to the changed environment, and that the Government acts to:

- ▶ *Promote investment in information technology and advanced communications services;*
- ▶ *Promote a greater understanding of the potential of eBusiness to become integrated into key business functions and to boost revenues and reduce costs;*
- ▶ *Create a critical mass of business critical applications – for example, Government eProcurement.*

Section 2 of the Executive Summary compares Ireland's environment for eBusiness growth with those in leading countries and identifies the key actions required for the successful development of eBusiness.

2 Irish Business Environment

Introduction

This section of the report reviews key environmental factors that influence the adoption of eBusiness. In each case, selected examples of best international practice are given. The countries chosen for comparative purposes include the US, the UK, Singapore and a number of European (both EU and non-EU) countries. The situation in Ireland is described and policy priorities are identified. A summary of key priority actions is included.

Government Policy

Government policy provides the overall framework for a supportive eBusiness environment. A supportive government policy is critical to the development of a supportive environment for the development of eBusiness. This is widely recognised internationally and all of the leading eBusiness nations have put in place policy frameworks to support the adoption of eBusiness. Emerging best practices for government policy include:

- ▶ *Government eBusiness and information society strategies published and progress on the implementation of these strategies measured on a regular basis. These strategies should cover such issues as:*
 - *Legal and regulatory issues;*
 - *eGovernment;*
 - *ePayments;*
 - *Business (in particular SME) and consumer adoption of eBusiness;*
 - *Skills;*
 - *ICT R&D;*
 - *The Digital Divide.*
- ▶ *The assignment of political responsibility for the implementation of the strategy, and a clear governance structure with sufficient resources to ensure speedy implementation of the strategy;*
- ▶ *A high level of awareness/buy-in from senior politicians and policymakers.*

Ireland compares favourably with the world's leading countries for this factor. The Government has published strategies dealing with the Information Society, eBusiness, and eGovernment⁹ and these have been updated. It is clear that senior political figures in Ireland are aware of the importance of eBusiness and eGovernment. Steps are being taken to address the Digital Divide through the Community Application of Information Technology (CAIT) initiative.

However, there are some key challenges remaining. There is no single agency responsible for the overall implementation of government strategy. Many agencies and departments co-operate on an ad hoc basis. To meet these challenges, the Government has recently put in a new set of structures designed to improve inter-departmental co-operation and deliver a more coherent overall approach, at the highest level of Government, to promote the formulation and implementation of policy on a wide range of issues that increasingly cut across traditional Departmental boundaries.

⁹ *Implementing the Information Society in Ireland: An Action Plan, Department of the Taoiseach, January 1999. eCommerce: The Policy Requirements Forfás June 1999 and 'New Connections', Department of the Taoiseach, April 2002.*

These structures include:

- ▶ *A Cabinet Committee on the Information Society;*
- ▶ *A complementary eStrategy Group at Secretary General level;*
- ▶ *A new Information Society Commission;*
- ▶ *And an expanded Information Society Policy Unit (ISPU) in the Department of the Taoiseach.*

The critical challenge now is to clearly define the roles and responsibilities of these new structures, to ensure that they operate in a complementary fashion and therefore that the potential of these structures is fully utilised.

eGovernment

eGovernment is the application of the tools and techniques of eBusiness to the work of government. Globally, eGovernment is at an early stage of its development and falls behind progress in the enterprise sector. However, a number of countries are moving towards “connected government”, that is, government using an approach which structures services online around particular goals, such as starting a business.

eGovernment is important for a number of reasons. Firstly, by using eBusiness to conduct its own business, government serves as an exemplar of best practices and sends a powerful message to the marketplace that eBusiness is secure and capable of delivering real business benefits. Secondly, the use of eGovernment lightens the burden of interacting with government for both businesses and citizens. Thirdly, the use of eGovernment allows government to deliver more and better services with fewer resources.

Emerging best practice for eGovernment includes:

- ▶ *A significant number of transactional services available to business and citizens;*
- ▶ *Specific targets set for eGovernment-to-business and eGovernment-to-citizen transactions;*
- ▶ *Use of eProcurement to encourage SMEs to go online to win government business;*
- ▶ *Movement to “connected government” characterised by:*
 - *Intentions based approach which structures services around a particular end goal such as starting a business;*
 - *Sharing and integrating processes across departments;*
 - *Use of shared services to cut the cost and increase the quality of services delivered both internally and externally.*

The Irish Government is strongly committed to the online delivery of its services. The success of the Government’s efforts can be seen in a recent report by Accenture¹⁰, which showed that 65% of Irish executives believe that the Irish Government is an exemplar of eGovernment. The critical challenge for Ireland’s eGovernment programme is to ensure close co-ordination and collaboration between previously discrete government departments and agencies. Putting in place an effective governance structure will be essential to meeting this challenge. The single most important initiative government can take to encourage SMEs to go online is to implement its own eProcurement strategy as a flagship project.

¹⁰ *The Unexpected eEurope, Accenture, October 2001.*

Legal and Regulatory

People who transact business electronically want to feel confident that they have the same legal protection online as offline. Therefore, if companies are to be persuaded to do business online, or to locate online operations in a given country, they need to be sure that they are operating in a legal environment that protects their legitimate interests.

Governments are also increasingly concerned by the harmful uses of the Internet – for example, as a communication tool by terrorists and as a means of distributing child pornography. In enacting legislation, it is of critical importance that a balance is struck between the legitimate privacy concerns of businesses and citizens and the state's security concerns. Legislation also has a critical role to play in creating a pro-competitive telecommunications marketplace that is essential to the growth of eBusiness.¹¹

A number of emerging best practices can be discerned in the area of eBusiness legislation. These include:

- ▶ *Twin-track legislative approach focusing on both the creation of a competitive telecoms market and a supportive legal framework for eBusiness;*
- ▶ *“Light touch” technology-neutral legislation in place governing electronic signatures, contracts, regulation of certification authorities, encryption, cyber crime, data protection, consumer protection, eMoney and contract liability;*
- ▶ *Copyright – World Intellectual Property Organisation (WIPO) treaties signed and implemented;*
- ▶ *Judicial competence developed in information technology, eBusiness, and intellectual property law.*

Significant progress continues to be made in Ireland. The enactment of the eCommerce Act 2001, the Copyright Act 2001, and the Broadcasting Act 2001, have all significantly improved the regulatory framework for eBusiness.

The critical challenge now is to develop an overarching legislative strategy for eBusiness, which will enable Ireland to create a distinct legislative position within the framework laid down by EU directives, based on a shared understanding of the Government's strategic intent by all Government departments. The Government has already recognised the need for greater co-ordination between departments, and has established an interdepartmental committee to look at eBusiness legislation.

However, simply enacting legislation is not enough. There is also a need to build up experience in information technology law, eBusiness, and intellectual property law within the judiciary. For this reason, consideration should be given to the creation of a special court to deal with these issues similar to the Patents Court in the UK.

Support Services

Support services include services such as telecommunications, netsourcing¹², electronic payments, business-to-business exchanges (or marketplaces) and consultancy services. Telecommunications is the subject of separate Forfás reports, so this section concentrates on netsourcing, electronic payments and B2B exchanges.

¹¹ Telecommunications is not covered in detail in this report.

¹² Netsourcing is defined as the rental of business applications and process delivered by a third party over a network (usually the Internet).

Support services are important because they provide the critical enablers that allow firms to conduct eBusiness. Netsourcing, for example, enables new business opportunities such as digital distribution of software and other content, as well as opportunities for existing business to outsource IT-related business processes. Electronic payments provide the most cost-effective method for the settlement of payments by banks, firms and individuals. Emerging best practices for support services include:

- ▶ *Competitively priced national broadband infrastructure with technical and carrier diversity;*
- ▶ *Ready availability of “low cost always on” telecommunications for SMEs;*
- ▶ *Presence of a variety of the new Internet infrastructure and service providers – for example, netsourcing firms (providers of Internet data centre space and managed services);*
- ▶ *Presence of a variety of B2B exchanges;*
- ▶ *Movement to the greater use of digital signatures and electronic payments.*

Support services for eBusiness have improved significantly over the last two years. In particular, the netsourcing industry has developed, mainly as a consequence of the Global Crossing initiative, which provided Ireland with sufficient international connectivity to enable netsourcing firms to use Ireland as a location to serve the European market. However, in common with the sector globally, the netsourcing sector in Ireland is undergoing a period of consolidation. If firms are to survive this period of consolidation, they will need to move up the value chain from simply providing space in Internet data centres¹³ to the provision of managed services.

Electronic payments is one area in which Ireland lags behind the international leaders such as Canada, Norway and Singapore. However, there is now renewed evidence of Government commitment to the implementation of a national ePayments strategy. The Department of the Taoiseach¹⁴ has recently been in talks with the Irish Payments Services Organisation about the creation of a universal bank account, which would be the first step in enabling all citizens to access ePayment services.

The most critical challenge facing support services is to ensure that Ireland possesses a strong base of netsourcing firms to enable major eBusiness operations to be conducted from Ireland. From the perspective of economic efficiency, it is desirable that Ireland should press ahead with the implementation of a national ePayments strategy. While telecommunications is not the focus of this report, it must be pointed out that delays in the roll-out of regional broadband infrastructure and service is having a negative impact on the development of eBusiness in Ireland.

To meet these challenges, a number of actions are recommended. The marketing drive to position Ireland as a centre of the netsourcing industry should be increased and firms should be encouraged to use the facilities and services now available here. In addition, netsourcing firms should be encouraged to move up the value chain from the provision of space in Internet data centres to the provision of fully-managed services. A national strategy for ePayments should be implemented.

¹³ *Internet Data Centres are the physical infrastructure, which enables netsourcing. Managed services refers to the management of third-party applications within Internet data centres.*

¹⁴ *Irish Times, 'State Universal Bank Account On the Cards', 9 November 2001.*

Financial Environment

This section refers to the availability of seed, venture, and equity capital. Seed capital is required to develop an initial idea into a business plan, which can then be put to venture capitalists for start-up and later for expansion funding.

A supportive financial environment is essential for the development of a vibrant technology sector to underpin the development of eBusiness and to assist in the creation of enabling technologies.

Emerging best practices for this factor include:

- ▶ *Ready availability of venture capital;*
- ▶ *Ready availability of specialist knowledge on business development;*
- ▶ *Presence of international specialist venture capital firms;*
- ▶ *Presence of a pool of angel investors¹⁵;*
- ▶ *Ready access to capital markets.*

The Irish venture capital market has improved significantly over the last number of years. In 2000, for example, Irish venture capitalists invested a record €208.2m. It is likely that 2001 will not prove to be as active, given the recent tightening of the venture capital market. In January 2002, Enterprise Ireland announced an investment of €95 million in twelve new venture capital funds to be managed by private sector partners, which should leverage an estimated €400 million for investment in start-up and early stage businesses. Therefore, the health of the Irish venture capital market looks strong. However, it would be useful to have a greater presence of international specialist venture capital firms operating in the Irish market, as venture capitalists are not only sources of funding – in addition, they provide advice and industry contacts to their clients. For this reason, it would be desirable to attract more specialist international venture capitalists to the Irish market, despite difficult international market conditions.

ICT Adoption

Widespread use of Information and Communications Technologies (ICTs) is fundamental to the adoption of eBusiness by both business and consumers.

Emerging best practices in ICT adoption include:

- ▶ *High level of Internet penetration among both businesses (in particular SMEs) and consumers;*
- ▶ *High level of Internet hosts;*
- ▶ *High level of PC penetration;*
- ▶ *High level of mobile phone penetration;*
- ▶ *High level of interactive digital TV penetration;*
- ▶ *Programmes in place to address the Digital Divide.*

Given the importance of the SMEs to the Irish economy, this section concentrates on the adoption of ICTs by SMEs.

¹⁵ *Angel investors – high net worth individuals who invest in start-up companies.*

Chambers of Commerce of Ireland research on the adoption of ICTs by SMEs in Ireland found that¹⁶:

- ▶ *90% of Irish SMEs have at least one computer;*
- ▶ *81% of Irish SMEs have Internet access;*
- ▶ *46% of the companies surveyed had a web site, a 12% increase on 2000.*

However, the level of sophistication of eBusiness usage by Irish SMEs is a matter of concern. Email (73%) and information gathering (82%) remain the most popular applications, while only 31% of SMEs purchase online from suppliers or accept online orders from customers.

Accenture research indicates that Irish SMEs are adopting a “wait and see” attitude to the adoption of eBusiness. This is in part due to the hype, which accompanied the advent of eBusiness and the current challenges faced by the SMEs due to the economic slowdown.

The main challenge now is to combat SMEs’ scepticism by focusing eBusiness education programmes on the use of eBusiness to address the real needs of business – for example, on cost and competitiveness.

Research and Development

There is a relationship between the level of investment in research and development (R&D) in a country and the level of eBusiness activity. A high level of R&D activity is needed to develop the enabling technologies for eBusiness.

Emerging best practices in ICT R&D include:

- ▶ *High level of GDP spent on R&D;*
- ▶ *Strong commitment by Government to R&D;*
- ▶ *A base of major companies in the high-tech sector;*
- ▶ *Close collaboration between the state sector and the private sector in industrial research;*
- ▶ *International collaboration in R&D;*
- ▶ *High level of investment in postgraduate education and young researchers;*
- ▶ *Targeted research in priority areas.*

The establishment of Science Foundation Ireland, a new national foundation dedicated to world-class excellence in research in ICT and biotechnology, was launched in July 2000. It will administer the €711m Technology Foresight Fund. Researchers from home and abroad have been invited to compete for funding. In its first call for proposals, SFI announced funding of €71m to 10 principal investigators who are heading up teams, each consisting of 10-12 researchers carrying out leading edge international research in Ireland. These teams will conduct research in ICTs and biotechnology for a period of 5 years.

This investment will transform R&D in Ireland. It would be useful to leverage this investment with appropriate marketing to position Ireland as an ICT R&D leader.

¹⁶ *SME eBusiness Survey 2001, Chambers of Commerce of Ireland, September 2001.*

Skills

In 2000, a survey by the Information Society Commission¹⁷ stated that 80% of Irish companies saw skills shortages as an important issue. However, the downturn in the technology sector, some closures of multinational and indigenous firms and a hiring freeze by many multinationals, have lessened the perception that a lack of skills is a major barrier to the adoption of eBusiness.

However, while this may well be the case in the short-term, it would be unwise to base the future educational policy on short-term trends. The most recent report of the Expert Group on Future Skills Needs¹⁸ predicts that the impact of the economic slowdown on the US would not have a major impact on demand for international IT professionals in the medium- to long-term. Therefore, it would be prudent to implement the recommendations contained in both the *Report on eBusiness Skills* and the *Third Report of the Expert Group on Skills Needs*.

3 Conclusions

The downturn in the world economy and the technology markets has significantly dampened the hype surrounding eBusiness. It is critical that this does not lead to complacency within Government or the business sector in Ireland. In many countries governments are using this period to advance beyond or to catch up with leading and competitor countries, in terms of producing an environment conducive to the growth of eBusiness.

International research also highlights that, as the hype has subsided, many organisations are developing long-term eBusiness strategies, that are moving beyond just developing a web site, to integrating ICTs and eBusiness into all aspects of their business processes. These strategies, while less visible to media attention and competitors, will result in real long-term gains to the companies involved. Companies and countries that do not respond dynamically to the challenges that eBusiness brings, may find themselves at a competitive disadvantage relative to e-enabled companies and countries, when the world economy improves.

eBusiness is bringing about revolutionary changes in the economy, in work practices and organisation, and in business models. eBusiness will continue to be one of the most significant drivers of enterprise development over the next three to five years. The extent to which Ireland succeeds in exploiting the opportunities presented by these developments will be a key determinant of Ireland's employment, income levels, and, ultimately, quality of life.

¹⁷ *How The Business Community Is Adapting to eBusiness, Information Society Commission, 2000.*

¹⁸ *The Third Report of the Expert Group on Future Skills Needs, July 2001.*

4 Summary of Key Recommendations

This section presents a summary of the key recommendations of this report. The recommendations are designed to position Ireland to take advantage of some of the key emerging trends in eBusiness and to improve the overall business environment for eBusiness in Ireland.

4.1 Key Emerging Trends

The main report reviews key technological trends and emerging opportunities for Ireland and based on this analysis the following recommendations are made.

4.1.1 mCommerce¹⁹

Action	Responsible
Encourage the roll-out of a 3G network in one of the regions to facilitate research in mCommerce.	Department of Communications and Natural Resources/ Commission for Communications Regulation ²⁰ /Department of Enterprise, Trade and Employment
Encourage Irish software firms to focus on attractive niches in the mCommerce value chain.	Enterprise Ireland

4.1.2 eMarketplaces

Action	Responsible
Following an analysis of eMarketplace service providers, conduct a targeted marketing campaign to position Ireland as a B2B exchange location.	IDA
Encourage Irish software companies to develop products that fill gaps in the B2B value chain.	Enterprise Ireland
Encourage Irish software firms to form alliances with the major providers of exchange infrastructure.	Enterprise Ireland

4.1.3 Digital Asset Management (DAM) and Digital Rights Management (DRM)

Action	Responsible
Encourage Irish software companies to create enabling technologies for DAM and DRM.	Enterprise Ireland
Seek to build relationships with international media and eLearning companies, and position Ireland as a centre for the delivery of rich digital content to both Europe and the US.	IDA
Encourage international media companies to locate their back-office functions for digital content services in Ireland.	IDA
Encourage the providers of netsourced DAM solutions to locate in Ireland.	IDA

¹⁹ Mobile commerce.

²⁰ Under the Communication Regulation Act, 2002, a Commission for Communications Regulation will be established to replace the Office of the Director of Telecommunications Regulation (ODTR).

4.1.4 Networking/Data Centres

Action	Responsible
Educate Irish firms in the benefits of netsourcing, and, where appropriate, encourage firms to consider using netsourcing solutions.	Enterprise Ireland/IDA
Encourage the formation of alliances between Internet data centre operators and IT services providers in order to deliver managed services.	Enterprise Ireland

4.1.5 Voice Technologies

Action	Responsible
Encourage Irish software companies to create voice technologies.	Enterprise Ireland
Examine the potential impact of voice technologies on the call centre industry in Ireland.	Enterprise Ireland/IDA

4.2 The eBusiness Environment

4.2.1 Government Policy

Action	Responsible
Create and implement a national ePayments Strategy.	Department of the Taoiseach
Set out clear deadlines for the implementation of eBusiness policies and publish progress reports on a regular basis.	Department of the Taoiseach/Department of Enterprise, Trade and Employment
Formulate a comprehensive eHealthcare strategy.	Department of Health and Children
Continue to encourage the adoption of eBusiness by Irish businesses and the implementation of eGovernment.	Department of the Taoiseach/ Department of Enterprise, Trade and Employment/Department of Communications and Natural Resources/Forfás

4.2.2 eGovernment

Action	Responsible
Set out an aggressive timetable for the implementation of the eBroker initiative.	Government
Utilise the enhanced governance structure to co-ordinate delivery of eGovernment services.	Department of the Taoiseach
Ensure the REACH team has adequate resources to fulfil its mandate.	Government
Prioritise an eProcurement programme for government as a flagship project.	Department of Finance
Put in place a structured communications programme to explain the benefits of eGovernment to all stakeholders.	REACH

4.2.3 Legal and Regulatory

Action	Responsible
<p>Create an overarching strategy for eBusiness legislation in Ireland, which focuses on creating competitive advantage for Ireland through appropriate legislation. Among the elements this strategy must address are to:</p> <ul style="list-style-type: none"> ■ Create a forum to enable policymakers, legislators, and industry to discuss eBusiness to ensure a co-ordinated and business-friendly approach to domestic regulation and EU directives; ■ Create a proactive regulatory environment in Ireland to help shape EU legislation and establish a strong lobbying organisation in Brussels to shape EU directives at an early stage; ■ Identify a distinctive approach to the incorporation of EU directives into Irish law in order to gain competitive advantage. 	<p>Department of the Taoiseach/ Department of Enterprise, Trade and Employment/Department of Communications and Natural Resources/Department of Justice, Equality and Law Reform</p>
<p>Select and provide special training for a number of judges who would then adjudicate on cases involving information technology and intellectual property law.</p>	<p>Judiciary</p>
<p>Ensure the licensing regime for Digital Terrestrial Television encourages the deployment and use of interactive services.</p>	<p>Commission for Communications Regulation</p>
<p>Assess the possibility of creating another domain name registry in Ireland to promote competition.</p>	<p>Department of Communications and Natural Resources</p>
<p>Ensure that IE Domain Registry Ltd continues its drive to create a more business-friendly service for Irish business.</p>	<p>Department of Communications and Natural Resources</p>

4.2.4 Support Services

Action	Responsible
<p>Increase the marketing drive to position Ireland as a centre for Data Centre Services, Managed Services, and Disaster Recovery.</p>	<p>IDA</p>
<p>Work with existing outsourcers and new entrants to position Ireland as a centre for international outsourcing operations.</p>	<p>IDA</p>
<p>Encourage the operators of Internet data centres to move up the value chain and provide Managed Services.</p>	<p>IDA/Enterprise Ireland</p>
<p>Continue to ensure that there is an effective, and co-ordinated, deployment of regional broadband infrastructures and services.</p>	<p>Department of Communications and Natural Resources/Forfás</p>
<p>Consider the use of tax incentives to encourage investment in open access broadband infrastructure.</p>	<p>Department of the Finance/ Department of Communications and Natural Resources</p>
<p>Agree and execute an implementation strategy for electronic payments.</p>	<p>Government/Banks/An Post/Utilities</p>

4.2.5 Financial Environment

Action	Responsible
Encourage US venture capitalists, especially specialist venture capitalists, to locate in Ireland. This would provide access to funding, expertise and international contacts.	IDA/Enterprise Ireland

4.2.6 ICT Adoption

Action	Responsible
Reposition programmes to educate SMEs about eBusiness to focus on achieving competitive advantage through eBusiness adoption.	Enterprise Ireland
Integrate eBusiness into all of the services offered by agencies.	Enterprise Ireland/IDA
Encourage the roll-out of broadband to the regions.	Government

4.2.7 Research and Development

Action	Responsible
Continue to market Ireland as a centre of R&D among the existing client base and potential new clients.	Science Foundation Ireland/IDA
Encourage international researchers to work in Ireland.	Science Foundation Ireland/IDA/Enterprise Ireland

4.2.8 Skills

Action	Responsible
Actively pursue the implementation of the actions and recommendations for the development of eBusiness skills contained in the Expert Group on Future Skills Needs' <i>Report on eBusiness Skills</i> and the <i>Third Report of the Expert Group in Skills Needs</i> .	Government
Proactively market Ireland as a location for foreign IT and software professionals (both EU and non-EU) who wish to build skills and develop their careers.	FÁS
Develop linkages with third-level colleges worldwide to source talent.	Department of Education and Science
Jointly develop eBusiness skills partnerships mechanisms to facilitate interaction between third-level institutions and business/industry and other interested stakeholders, e.g., trade unions.	Department of Education and Science
Implement the NCVA eBusiness course.	Department of Education and Science

1 Introduction

The Challenge of Technological Change

Technological change is progressing at an ever-increasing rate. Despite the recent downturn, information and communications technologies (ICTs) have become one of the most significant drivers of world economic growth.

eBusiness is bringing about revolutionary changes in the economy, in work practices and organisations, and in business models. eBusiness will continue to be one of the key drivers of enterprise development over the next three to five years.

The extent to which Ireland succeeds in exploiting the opportunities presented by these developments will be a key determinant of Ireland's employment, income levels, and, ultimately, quality of life.

eBusiness Hasn't Gone Away

The past two years have seen considerable changes in the environment for eBusiness, in the technologies available, and in the way they are being deployed. Some of these changes have slowed or changed the direction of business development, and there have been some highly publicised business collapses. Coupled with the major stock market correction in April 2000 and subsequent technology downturn in 2001, these have caused some people to think that eBusiness is no longer an issue – that it was a passing fad, that it can now be ignored, and that business can go on as it always has gone on.

Such a belief is ill founded and dangerous.

eBusiness continues to be the major issue facing enterprises today. How quickly they adapt, how well they adapt, and how flexibly they respond to changes in technology, in business relationships and customer behaviour will determine their success and indeed their ability to survive. The slowdown in the world economy increases the imperative for Irish businesses to adopt eBusiness and thereby increase their competitiveness.

How We Must Respond to this Challenge

To maximise the benefit to Irish society, we need to refocus our efforts to create the best possible environment for eBusiness and to promote the adoption of eBusiness by enterprise, especially by SMEs.

What is in this Report?

This document assesses the current position worldwide with regard to eBusiness, identifies the key eBusiness drivers, and, for each, describes how it is being addressed around the world and in Ireland. From this analysis, Ireland's relative competitive position can be gauged, and the areas requiring urgent intervention identified.

2 What is Happening in eBusiness?

What is in this Chapter?

This chapter examines the current position worldwide with regard to eBusiness. It looks at the take-up of eBusiness models by businesses, consumers and governments, the revenues generated, and employment in eBusiness. It also examines the effects of the technology sector downturn and subsequent slowdown in the world economy.

2.1 eBusiness Adoption

Uptake of Internet and eBusiness

In 2002, it is estimated that the US and Europe will each have more than 136 million people with Internet access. Of these, it is expected that some 48 million Americans and 34 million Europeans will shop online.

However, B2B eBusiness is growing more strongly than B2C and is of far greater significance. As the European Commissioner, Erkki Liikanen, for Enterprise & Information Society has stated

“B2B eBusiness is the most important issue facing Europe and the real issue this year. It is particularly important because that’s where the real productivity gains and cost reductions are.”²¹

Europe Different from the US

The eBusiness market in Europe is expected to develop differently from that in the US. Many Europeans will access the Internet using a mobile phone or digital TV, rather than a PC. In the US, the PC is the dominant means of access to the Internet and interactive services. This will have implications for Irish Internet hardware and software providers.

Europe already has a very high penetration of mobile phones operating to a single standard, and enjoys a global lead in the production of mobile phones. WAP services have been launched that allow access to online information and transaction services. While WAP has been a disappointment in terms of take-up, GPRS²² and the introduction of Third Generation (3G) mobiles are expected to facilitate the development of mobile eBusiness (or mCommerce) in Europe.

Japan

In Japan, i-Mode (a proprietary technology similar to WAP and developed by Japanese telecommunications company NTT DoCoMo) has been very successful, gaining 20,000 subscribers a month. As of December 2001, there were almost 30 million i-Mode subscribers in Japan. In addition, in October 2001, NTT DoCoMo launched 3G services in the Japanese market. The success of Foma, the world’s first 3G service using wideband, is critical, not only for DoCoMo (which is spending over €9.3bn on infrastructure and more on the handsets) but also for European operators that have spent an estimated €98bn to acquire 3G licences.

²¹ The eGlobal Report, January 2001.

²² General Packet Radio Service (GPRS) offers a fast (up to 115kbit/s) connection for the transmission of data to mobile phones. GPRS, which supports a wide range of bandwidths, is an efficient use of limited bandwidth and is particularly suited for sending and receiving small bursts of data, such as email and web browsing, as well as large volumes of data.

Digital TV

Digital TV is another significant area where Europe has a lead over the US. Strategy Analytics²³ predicts that by the end of 2001, 38 million European homes will have access to interactive digital TV, up from 20 million at the end of 2000. By the end of 2001, Western Europe accounted for 62% of the interactive digital TV audience compared to 18% in the US. The UK has the highest percentage of households with access to digital television. Strategy Analytics predicts that 40% of UK homes will have access to interactive digital TV by the end of 2001, followed by Denmark (25%), Spain (23%) and Sweden (22%).

B2B eBusiness

B2B eBusiness is of far greater significance than B2C. While there is a wide variation in the estimates of B2B and B2C eBusiness, all of the analysts agree that B2B activity will be far more substantial than B2C activity. Although most media attention has focused on companies, which serve consumers, it is the use of eBusiness within and between companies, which is of real importance.

The B2B sector worldwide in 2001 accounted for 79% of total eBusiness activity and is expected to grow to 87% of total eBusiness activity by 2002. B2B revenues are forecast to reach €3.5 billion by 2004.²⁴

The use of eBusiness by companies to integrate their supply chains, or for procurement offers real tangible business benefits by slashing transaction costs. The use of eBusiness in supply chain integration has, for example, led to inventory reduction of 25% to 60%, and lowered overall supply chain costs by 25% to 50%.²⁵

Change in Rate of Adoption

Fears of a sustained recession in the US, the downturn in the technology sector, and the subsequent shift in investment interest from dot-coms (pure-play Internet companies) to dot-corps (existing corporates who are using eBusiness) have begun to affect the adoption of eBusiness both internationally and in Ireland:

- ▶ *Large enterprises are taking a more considered approach to the implementation of eBusiness, since they no longer fear the loss of business to dot-com competitors*
- ▶ *Irish SMEs are now adopting a wait-and-see approach to the adoption of eBusiness*

Internationally, the highly publicised collapse of many dot-coms has reduced the perceived competitive threat from eBusiness. eBusiness has largely been driven by US corporates, and fears of a severe downturn in the US economy is causing US corporates to retrench and delay making significant investments, including investments in eBusiness.

²³ Strategy Analytics, "Interactive Digital Television: Worldwide Market Forecasts", February 2001.

²⁴ eMarketer, The eGlobal Report, 2001.

²⁵ Accenture Research, 2000.

Irish SMEs – Wait and See

In Ireland much of the interest, and indeed concern, about eBusiness in SMEs was driven by fear, and as that fear has subsided, firms have begun to adopt a wait-and-see approach to developing their eBusiness capabilities. Accenture research indicates that many Irish SMEs believe that the adoption of eBusiness is:

- ▶ *Over-hyped;*
- ▶ *Less urgent, now that the perceived competitive threat has waned;*
- ▶ *Likely to be cheaper and easier in the future as the available products and services improve and reduce in price.*

A Chambers of Commerce study²⁶ highlighted that only 21% of all businesses have a defined eBusiness strategy, even though 75% of business agreed strongly with the statement "It is very important to be involved in eBusiness".

Issues for SMEs

Many SMEs are grappling with the concept of eBusiness, and are in need of basic advice, while the high cost of ISDN lines, lack of "always-on access", and basic IT and web skills are additional barriers.

Issues for Larger Companies

For multinationals and the larger and/or more technologically literate enterprises, issues include capital rationing, and the lack of broadband telecommunications infrastructure outside of the Dublin region.

2.2 eBusiness Revenues

Rapid Growth

Global eBusiness revenues are growing rapidly. In 2000, global eBusiness revenues were worth €318.6bn, by the end of 2001 global eBusiness revenues were projected to rise to €613bn and by 2004 to rise to €3,569bn. In 2001 the B2B sector accounted for 79% of total eBusiness activity and is expected to grow to 87% of total eBusiness activity by 2002.

North America – the World Leader

North America continues to lead the world in eBusiness. In 2000, North American B2C eBusiness was estimated to be worth about €52.4bn, and North American B2B eBusiness at least €177bn.

UK

eBusiness revenues in the UK for 2001 are expected to reach €46.5bn and to rise to €209bn by the end of 2005²⁷.

Ireland

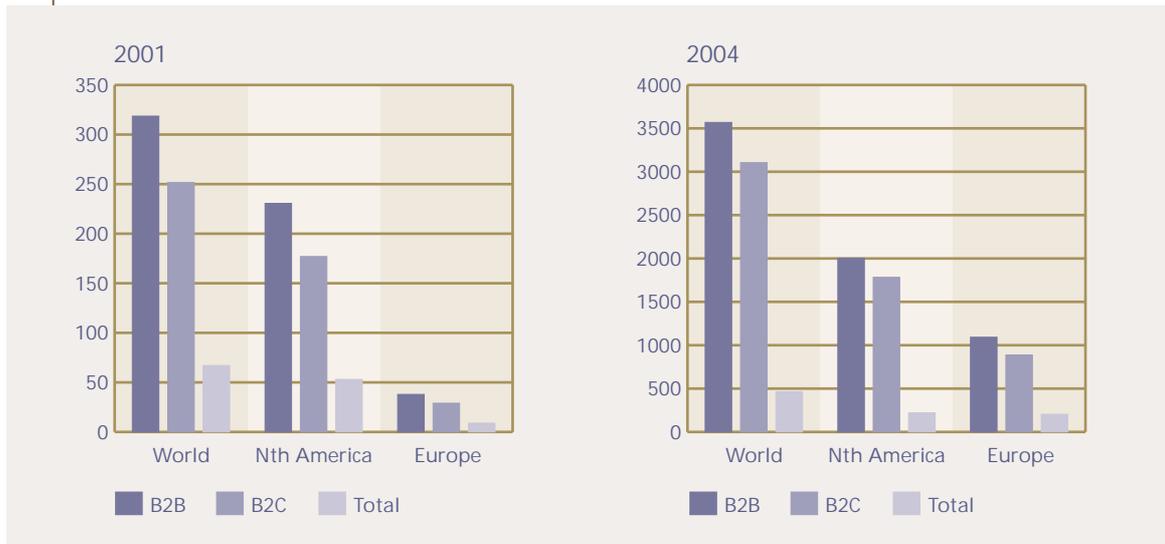
eBusiness revenues in Ireland in 2001 are projected to reach an estimated €1.21bn and to rise to €6bn by 2005²⁸.

²⁶ Chambers of Commerce of Ireland: SME eBusiness Survey 2000.

²⁷ Computer Economics, February 2001.

²⁸ Computer Economics, 2001.

Figure 1 B2B, B2C and Total eBusiness Revenues for the Years 2001 and 2004



Source: eMarketer.

2.3 eBusiness Employment

Jobs in the Internet Economy

By the end of 1999, Internet pure-plays, portals, Internet access and application companies had created three million jobs in the US and 905,000 in the six European countries covered by Spectrum Strategy Consultants' research²⁹ (France, Germany, Ireland, Italy, Spain, and the UK).

In the US, Internet jobs were forecast to reach 5.8 million by 2002 or 4% of the workforce; in the six European countries considered, they were forecast to reach three million.

In 2000, some 11,000 of the Irish workforce were employed in the Internet economy, and that was expected to rise to 30,000 by 2002.

However, given the slowdown in the ICT sector, growth in eBusiness employment is likely to have fallen. The *Financial Times*³⁰ estimates that major technology firms have laid off in excess of 244,000 people between 1 July and 1 October 2001.

2.4 The Effects of Stock Market Corrections

Major Correction in April 2000 and Technology Downturn

The most significant event affecting the development of eBusiness in the past 2 years was the stock market correction of April 2000. This correction saw the NASDAQ lose one-third of its value in less than a week, and set a trend for lower valuations for technology stocks. This has resulted in a general slowdown in the US and in the world economy. The dot-com implosion in the US was matched by a similar destruction of shareholder value in the European telecommunications sector. The exorbitant prices paid for 3G licences (an estimated €98bn³¹) burdened the major European telecommunication companies with huge debts.

²⁹ Accenture/Spectrum Strategy Consultants, *Internet Enabled Job Creation, 2000*.

³⁰ *Financial Times*, November 2001.

³¹ *FT Telecoms Survey, Challenges Ahead as Networks Start Building the Future, January 2001*.

Technical difficulties mean that no equipment manufacturer has yet demonstrated commercial equipment operating at anything close to the promised data speeds. This led to a decline in share values.

In September 2001³², shares in both Deutsche Telecom and France Telecom dropped below their Initial Public Offering (IPO) price. Weakness in the telecommunication sector was a major factor in the decline of the European technology sector in 2001, as Europe's technology firms are more dependent on the communications sector, than their US counterparts. According to UBS Warburg, about 50% of Europe's technology sector earnings are exposed to communications compared to a quarter of the US technology sector.

Shift in Investment Emphasis

Investment interest shifted from dot-coms (pure-play Internet companies) to dot-corps (existing corporates who are using eBusiness). Accenture believe there is strong evidence that existing corporations no longer fear that their businesses will be taken away from them by competition from dot-coms. This has resulted in a slower, more considered approach to the adoption of eBusiness by large enterprises.

Spectacular Collapses

A number of high-profile dot-coms collapsed, such as Boo.com, the online fashion retailer, the online health and beauty company Clickmango, and Net Imperative, (Internet News Service) as well as Irish Internet services companies such as Ebeon and Nua. These firms were unable to raise the required investment funding to continue in operation, as investors began to question their long-term viability. The correction has fuelled a major increase in the number of mergers and acquisitions within the Internet sector, and for the first time allowed existing corporations to purchase dot-com companies at realistic valuations.

Increased Emphasis on Infrastructure

There has been a major shift in the flow of venture capital funding from pure-play Internet ventures and especially e-tailers³³ to the providers of Internet infrastructure such as software, and in particular wireless and mCommerce technologies.

There is evidence of a move in venture capital funding from ICTs to bio-pharmaceuticals. In the US, equity investments³⁴ in the third quarter of 2001 fell by 23%. Over 80% of the €1.9bn decrease was due to cutbacks in investments in consumer/business services, in software and in the information services segments. Software investment declined by 40%, while information services declined by 42%. However bio-pharmaceuticals investments remained consistent throughout the year.

Slower Developments

The reduced availability of capital has slowed or delayed the pace of technological change in a number of sectors, such as the digital content sector.

Delayed Initial Public Offerings (IPOs)

Stock market volatility has delayed the IPOs of many technology firms such as the consultancy firm Oniva, Adexa Inc. (software company) and 800.com (online electronics retailer) and created a more cautious attitude to investing by venture capitalists. In the first quarter³⁵ of 2000, €161bn was raised in IPOs worldwide, but only €49bn was raised in the third quarter of 2001. There were no IPOs at all in September 2001.

³² FT, "KPN Replace Chairman as Telco Worries Continue", 14 July 2001.

³³ eTailer: B2C retailers on the Internet.

³⁴ Montytree Highlights, Q3 2001.

³⁵ The Economist, "So Long Banker", 25 November 2001.

3 Significant Business and Technological Developments

What is in this Chapter?

A number of trends have emerged in technology and in the ways in which technology is deployed. These trends represent significant new opportunities for Ireland and are discussed in this chapter as follows:

Topic	See Page
3.1 mCommerce	9
3.2 eMarketplaces	14
3.3 Digital Asset Management and Digital Rights Management	16
3.4 Netsourcing/Data Centres	19
3.5 Voice Technology	23

For each of these topics, the potential market size is outlined, the value chain is defined, and emerging trends are identified. The current situation in Ireland is examined and key actions to strengthen Ireland's competitive position are set out.

3.1 mCommerce

What is mCommerce?

mCommerce can be defined as extending eBusiness to anytime, anyplace, anywhere, typically using Internet-enabled mobile phones or other wireless Internet access devices.

Why is it Important?

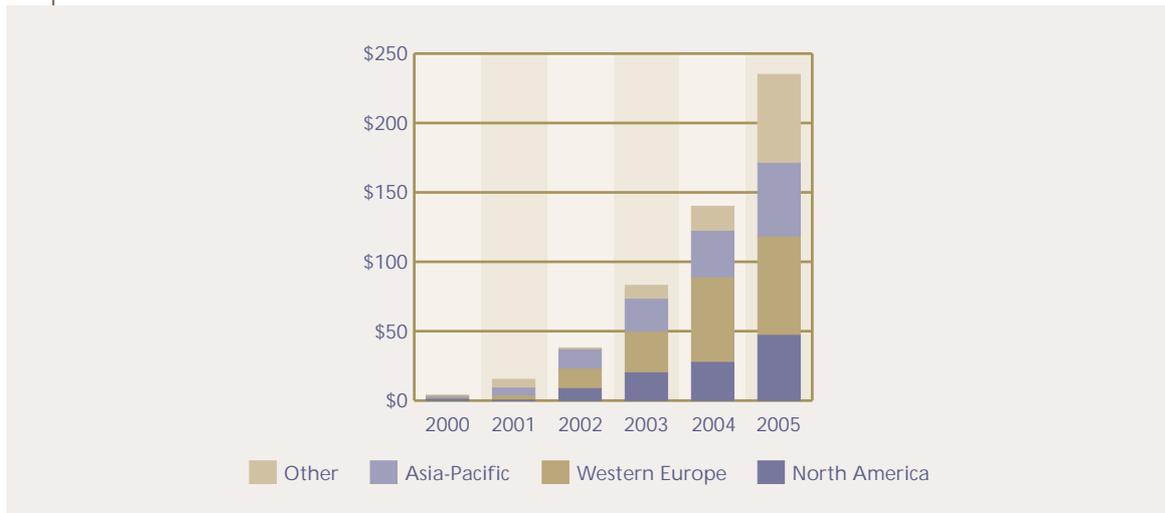
For some time now, mCommerce has been seen as the next high growth area, due mainly to rapidly growing penetration of mobile phones. Nokia estimates that by 2005 there will be more Internet-enabled handsets than PCs on the Internet.

Ovum estimates that global mCommerce revenues will grow from €4.5bn in 2000 to €235bn by 2005³⁶. Durlacher estimates that the European mCommerce market will grow from €323m in 1998 to €23bn by 2003³⁷.

³⁶ Ovum, *Mobile eBusiness Market Strategies*, March 2000. Revenues include the value of the transactions, together with the transactions cost and the telecommunications costs associated with the transaction and any subscription fees.

³⁷ Durlacher, *Mobile Commerce*, December 1999.

Figure 2 Global mCommerce Revenue Growth Projections



Source: Ovum.

Note: Revenues include the value of the transactions, together with transaction costs and the telecommunications costs associated with the transactions, and any subscription fees.

The continued evolution and deployment of more advanced networks across Europe and the rest of the world are critical to realise the full potential of mCommerce. The roll-out of new networks and in particular, the roll-out of Third Generation (3G) networks, is critically dependent on the ability of hardware and software companies to develop the technology, and on the ability of telecommunications companies to fund this programme and to develop solid business models to generate revenues from the new services.

From an Irish perspective, mCommerce is important because Ireland has a large number of software firms producing wireless applications. A report by HotOrigin³⁸ found that 41% of the 250 Irish software products companies are building wireless applications. Failure to develop 3G networks and services quickly for businesses and consumers in Ireland will also hamper companies doing research in the area of wireless technology and mCommerce.

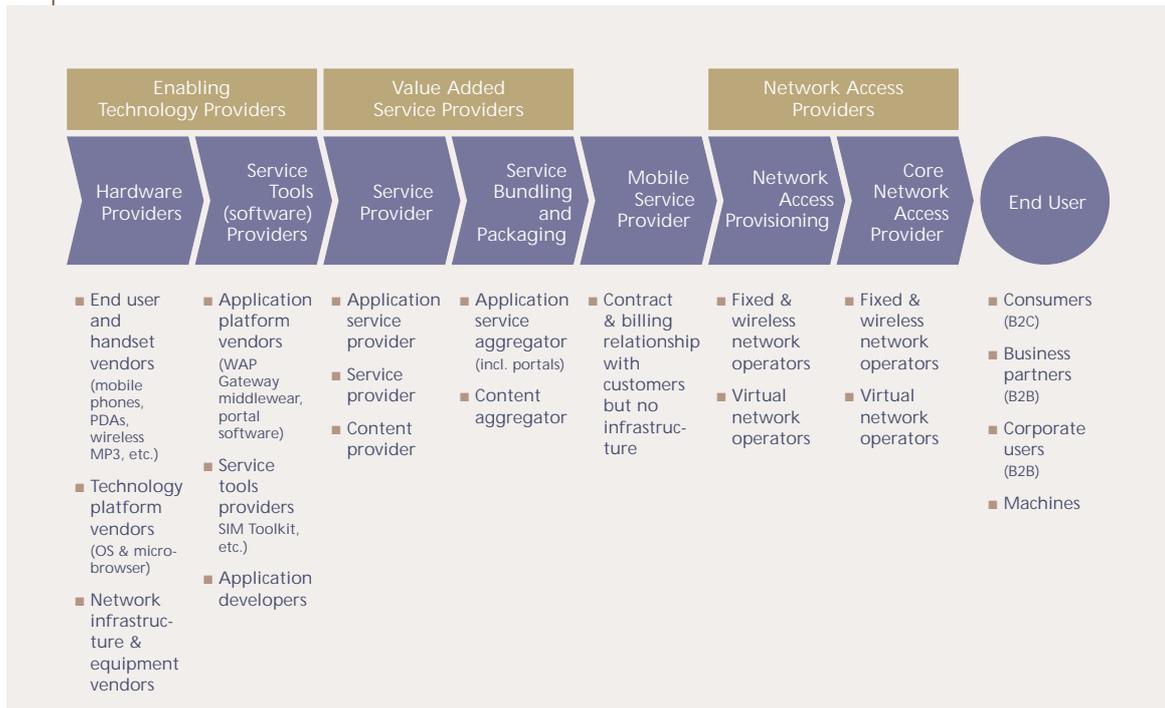
Value Chain

The mCommerce value chain includes:

- ▶ *Hardware providers (end-user equipment and handset vendors, technology platform vendors, network infrastructure and equipment vendors, and application platform vendors) e.g., Nokia, Motorola, Ericsson, 3Com;*
- ▶ *Service tools providers, e.g., Jinny Software, Trintech;*
- ▶ *Service providers including content providers, e.g., Banking, shopping and new media;*
- ▶ *Service bundling and packaging (application service aggregators and content aggregators), e.g., wireless portals such as e-merge.ie;*
- ▶ *Network access provisioning (fixed, wireless and virtual), e.g., Vodafone, O₂, Meteor;*
- ▶ *Core network access providers (fixed, wireless and virtual);*
- ▶ *End-users (both B2C and B2B).*

³⁸ Hot Origin, Ireland's Emerging Software Cluster: A Hothouse of Future Stars, May 2001.

Figure 3 Stages in the mCommerce Value Chain



Key Trends Worldwide

mCommerce has not taken off as quickly as expected in the US and Western Europe. Many reasons have been advanced for this such as:

- ▶ *Poor technical quality of WAP-enabled phones;*
- ▶ *Scarcity of compelling services;*
- ▶ *Poor quality, slow services;*
- ▶ *Unreliable connections;*
- ▶ *Complexity and difficulty of use;*
- ▶ *High cost, both of calls and of WAP-enabled handsets.*

Most available WAP services are relatively banal and not attractive to the majority of potential users. Currently available applications include phone personalisation, social services (chat services, email, public SMS message boards, and so on), and content services (news, stock quotes, horoscopes and train timetables).

Some of the technical problems will be solved by GPRS (General Packet Radio Service). This is an emerging network technology that enables the transmission of high-speed packet-switched data. It provides "always-on access", which removes many of the problems now affecting WAP and provides a far better user experience.

Key Trends: Japan

Much international attention has been focused on developments in Japan. In September 2001, NTT DoCoMo launched the world's first 3G service using W-CDMA technology.

The success of NTT DoCoMo's Foma, the world's first 3G service using wideband CDMA technology, is critical not only for DoCoMo, which is spending over €9.3bn on infrastructure and more on the handsets, but for European operators who have spent an estimated €98bn to acquire licences to offer 3G services.

mCommerce in Japan has been significantly more successful than in Europe. In Japan, the standard adopted is i-Mode, which is a WAP-like text-based mobile information service. Unlike WAP, however, i-Mode runs on a network that supports packet-switching technology. This gives a better user experience, and allows the operator to charge by the packet, or amount of data, rather than by the time the user spends on the network.

i-Mode allows users to send emails and to access specially configured web pages. About 500 of the most popular pages are stored on the handset itself, and more than 15,000 are readily accessible. There are more than 650 authorised content providers and 24,000 unauthorised content providers providing content to i-Mode users.

Since its launch in 1999, NTT DoCoMo has signed up almost 30 million subscribers to its i-Mode service. This success is due to the better service quality, wider range of content and a more attractive pricing model. It may also be due to the lower PC/Internet penetration rate in Japan, and the popularity in Japan of applications such as downloadable cartoon characters.

Entertainment functions such as cartoons, games and horoscopes, account for 59% of access to i-Mode pages. Commercial transactions such as banking, stock price quotes, flights and hotel reservations account for 17%, while database functions account for 9%. The remaining 15% is accounted for by information services such as sports, news and weather.

Key Trends: US

Europe and Japan are both currently ahead of the US in the adoption of mCommerce for a number of reasons:

- ▶ *Lower market penetration of wireless devices in the US;*
- ▶ *Lower handset turnover rates in the US;*
- ▶ *Mobile phone users in the US pay for incoming calls, unlike their European counterparts. This has slowed the adoption and use of mobile phones, and, as a consequence, the growth of mCommerce;*
- ▶ *The US has a higher penetration of PCs with Internet access. Thus, users already have access to a competing eBusiness channel;*
- ▶ *The US has a fragmented carrier market, whereas in other countries there is generally one dominant carrier;*
- ▶ *A number of different standards are in use in the US (TDMA, CDMA, GSM) whereas GSM has been accepted as the standard elsewhere;*
- ▶ *There have been difficulties with spectrum allocation in the US.*

Emerging Trends

Although mCommerce is still in its infancy, a number of key trends are emerging:

- ▶ *The volatility in the stock market and the high cost of 3G licences has weakened the financial position of many European telecommunications companies. This will delay the upgrading of Europe's networks;*
- ▶ *NTT DoCoMo will be in a very strong position to challenge the incumbents in the European market – due to its experience with i-Mode and the fact that it will be one of the first to launch a 3G service;*
- ▶ *As with the Internet, the availability of good content will be critical to the uptake of mCommerce.*

Ireland

Ireland is well represented all along the mCommerce value chain. In particular, Ireland is well represented by software development firms including multinationals such as Motorola, Alcatel, CMG and Ericsson who are piloting a 3G network, and indigenous Irish firms such as Comnitet and Cyantel.

However, Ireland will now be the last EU government to award 3G mobile phone licences in mid 2002.

Following the announcement of the launch of the 3G licence tendering process in December 2001, it is critical that all licences are issued as soon as possible. Further delays will damage the reputation of Ireland as a high-tech location and inhibit the development of the wireless sector in Ireland.

In the interim, it would be useful to encourage the roll-out of a local 3G network in a regional centre to encourage the development of a software centre of excellence in mCommerce.

It is important that Irish companies develop products that are differentiated from their competitors and focused on attractive niches in the mCommerce value chain, such as voice recognition technology and security.

Key Actions

The following key actions are identified:

Action	Responsible
Encourage the roll-out of a 3G network in one of the regions so as to facilitate research in mCommerce.	Department of Communications and Natural Resources/ Commission for Communications Regulation/Department of Enterprise, Trade and Employment
Encourage Irish software firms to focus on attractive niches in the mCommerce value chain.	Enterprise Ireland

3.2 eMarketplaces

What is an eMarketplace?

An eMarketplace is a digital forum that brings buyers and sellers together to:

- ▶ *Conduct pre-sales activities;*
- ▶ *Transact sales;*
- ▶ *Complete post-sales activities.*

eMarketplaces may be:

- ▶ *Buyer-centric, in which a single or a small number of buyers buy from a large number of sellers;*
- ▶ *Seller-centric, in which a company sells its products or services to numerous customers;*
- ▶ *Linear, in which the commodity is sold down along the supply chain;*
- ▶ *Exponential, where one participant is both buyer and seller.*

Two Kinds of eMarketplaces

There are a number of consumer marketplaces such as ebay.com and ebid.com. The real importance of eMarketplaces is for B2B transactions for which there are two main kinds of B2B marketplaces: vertical and horizontal.

- ▶ *Vertical marketplaces, or industry markets, are specific to one industry. They bring together buyers and sellers from that industry. Vertical B2B markets typically trade in direct materials which are core to a company's product offering. Direct materials include raw materials, industry-specific parts and industrial equipment.*
- ▶ *Horizontal marketplaces are cross industry and are created to deal in standardised products and services such as computers. Horizontal B2B markets are focused on indirect materials – the materials that are required to run a business such as MRO services (Maintenance, Repair and Operations), travel and entertainment, office equipment and supplies. Indirect goods are often the same across a number of industries and therefore of interest to a wide range of companies.*

Why are eMarketplaces Important?

Forrester Research believes that the Northern European countries (Belgium, the Netherlands, Luxembourg, Nordics, UK, Ireland, Germany and Austria) will drive the adoption of eMarketplaces, and that Ireland, which trades extensively with the US and the UK, will be one of the early adopters³⁹. By 2005 Forrester Research believes that eMarketplaces will account for 55% of all B2B trades.

Value Chain

To operate successfully, eMarketplaces need to have the following components:

- ▶ *Core Business Services, such as the market-making mechanism (catalogue, exchange, auction), product content management and community building;*
- ▶ *Value Added Services, including services such as liquidity/sourcing, collaborative supply-chain planning, fulfilment, billing and finance, marketplace activity and data analysis information;*
- ▶ *Enabling Infrastructure, which includes transaction processing, workflow, messaging security and integration services.*

39 Forrester Research, Euro Marketplaces Top Hype, May 2000.

The B2B Value chain shown below is a somewhat idealised picture, B2B eMarketplaces are as yet in a very early stage of development, and there are still gaps in even the most sophisticated eMarketplace offerings, notably in the areas of payments, security and fulfilment.

Figure 4 B2B eMarketplace Value Chain



Recent Trends

The most notable trend in the development of eMarketplaces has been the growth in the number of private exchanges. Private exchanges are essentially extranets that companies use to improve their own supply chains, such as the eProcurement portal being developed by IBM in Dublin for their European suppliers. The benefits include real-time communication with suppliers, the ability to better market a company's products and services to its customers, and the ability to know immediately which products are selling through distributors. For example, by using an eProcurement hub for global procurement, Hewlett-Packard reduced rogue purchasing⁴⁰ and was able to save 5% in procurement costs.

Consolidation and a general slowdown in the adoption of eMarketplaces have been another major trend over the past year. Consolidation among the Internet start-ups has taken away some of the pressure on industry-supported eMarketplaces to roll-out their offerings, or to do so in a more incremental fashion, i.e., leaving out some of the more difficult business processes from their marketplaces such as epayment.

Ireland

A number of eBusiness marketplaces have been established in Ireland. While it is perhaps too early to judge the success or otherwise of these ventures, the results so far have been mixed:

- ▶ *Worldoffruit.com closed, April 2001;*
- ▶ *Buildonline.com acquired second round funding of €15m in April 2001. Jupiter Research, a leading industry analyst, includes BuildOnline in its 'top ten list' of B2B companies most likely to succeed in Europe;*

⁴⁰ *Digital Emporium, eMarketplace Ease Procurement Headaches, www.nwfusion.com, February 2000.*

- ▶ *IngredientsNet.com has gone into liquidation;*
- ▶ *iCommerce, an initiative of the Chambers of Commerce and Business and Finance magazine, has launched a transactional web site and currently has over 2,400 active members;*

Given the fact that Ireland has the requisite infrastructure (international connectivity, Internet data centres) and a favourable taxation regime, Ireland is in a good position to market itself as a location for B2B exchanges.

In addition, there are still gaps in the technology for B2B exchanges (for example, in the area of payments), which may represent opportunities for Irish software firms to develop niche applications. To market these applications successfully, it will be necessary for Irish firms to develop relationships with the major providers of exchange infrastructure.

Key Actions

The following key actions are identified:

Action	Responsible
Following an analysis of eMarketplace service providers, conduct a targeted marketing campaign to position Ireland as a B2B exchange location.	IDA
Encourage Irish software companies to develop products that fill gaps in the B2B value chain.	Enterprise Ireland
Encourage Irish software firms to form alliances with the major providers of exchange infrastructure.	Enterprise Ireland

3.3 Digital Asset Management and Digital Rights Management

Introduction

The convergence of communication, technology, and content is creating a new marketplace where content and services are increasingly delivered digitally. To succeed in this new marketplace companies need new capabilities and infrastructure to deliver this content. Equally, companies must be confident that in enabling digital delivery of their content they are not enabling the piracy of that content. Companies therefore require two major capabilities:

- ▶ *Digital Asset Management (DAM) and*
- ▶ *Digital Rights Management (DRM)*

What is Digital Asset Management?

Digital Asset Management (DAM) encompasses the strategies, technologies and processes required to create, store, retrieve, approve, distribute and leverage rich media content such as video, audio, images and graphics, as well as text.

What is Digital Rights Management?

Digital Rights Management (DRM) enables the secure sale, distribution and appropriate use of Digital Content. DRM focuses on the access rights, prices and distribution rights that surround the content.

Why are these Important?

The convergence of communications technology and content is creating a new marketplace where content and services tend to be delivered digitally. To succeed in this new marketplace, companies need new capabilities and infrastructure to deliver this content. Equally, companies must be confident that, in enabling digital delivery of their content, they are not enabling the piracy of that content.

The need for digital content has been driven by an explosion in the number of access devices (PC's, smart phones, PDAs (Personal Digital Assistants), interactive digital TV, gaming consoles) and the increased availability of bandwidth. In turn, the adoption of new access devices has been driven by the availability of content.

The growth in access devices and the greater availability of bandwidth will serve to increase the amount of transactions over these devices. According to several industry sources, the market for Digital Content Services will grow from approximately €145bn in 2001 to an estimated €390bn in 2005⁴¹.

However, growth is crucially dependent on the development of DRM. The Recording Industry Association of America estimates that the recording industry loses €5.6bn per year to piracy worldwide, €1.1m per day in the US alone⁴². If firms are to have confidence in digital distribution, they must be confident that their intellectual property rights can be protected.

The DRM market is still emerging, and there are currently no dominant players. However, the sector is attractive and already established software and services companies such as Microsoft and IBM, are focusing on this area, as are new companies such as Content Guard, Preview Systems, netLibrary and Reciprocal.

Value Chain

There are four main parts to the value chain for DAM and DRM services:

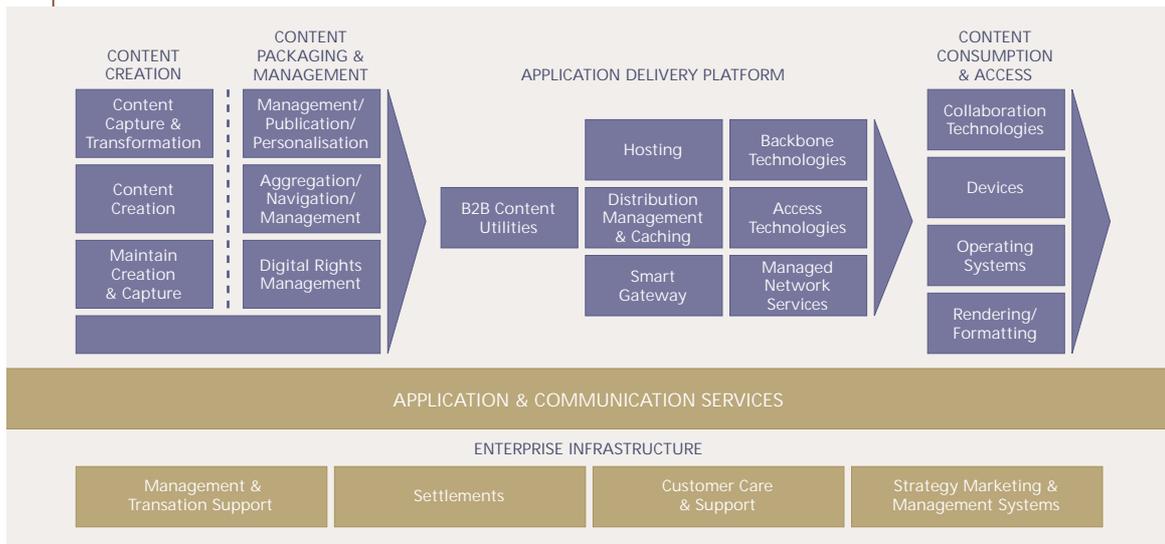
- ▶ *Content Creation, Packaging and Digital Asset Management (DAM) are concerned with the process and technical capabilities to support the development of digital content. It covers the creation of content, the development of reusable media-neutral content, the creation of digital libraries to store and manage that content, the customisation of content based on users' preferences and profiles, and the publication and secure distribution of the content in finished format. It also covers the creation of metadata (data about data) in order to provide detailed information to allow for searches and customisation.*
- ▶ *The Application Delivery Platform is concerned with the technologies required to support, enable and deliver these services. The area covers the backbone technologies that are used by the enterprise and by the Internet to transport digital content at high speeds. It also covers areas such as physical hosting, and access technologies such as xDSL, cable modems and so on.*

⁴¹ Meta Group January 2001, Forrester Research 2000, AT Kearny Network Publishing, Accenture Analysis.

⁴² <http://www.riaa.com/Protect-campaign-3.cfm>.

- *Content Consumption and Access covers the capabilities needed to support consumer access and interaction with digital content services. It covers such areas as the physical device used to access the content, the operating system and the application software on the device, as well as collaboration technologies that allow real-time access via shared documents or shared messaging.*
- *Enterprise Infrastructure covers the capabilities needed to support a content business, such as order management and transaction support, customer care and the distribution of financial information to all parties involved.*

Figure 5 The Digital Content Services Value Chain



Recent Trends

Among the trends in this industry are:

- *Increase in digital content – there is a general trend to move physical assets into digital form;*
- *Greater emphasis on digital asset reuse – digital assets are being reused to save development costs and to generate additional revenue for each asset;*
- *A single DAM system for all digital assets – many companies would like to store all of their digital assets in one system regardless of media type;*
- *Integration with downstream systems – DAM vendors are developing alliances with web content management vendors. Integration with DRM systems will also be critical;*
- *Focus on brand management – companies from many industries are focusing on eMarketing and looking to develop, manage and use their brand assets in both the electronic and the physical worlds.*

The stock market volatility is affecting the digital content sector. Rupert Murdoch's US-based subsidiary News Digital Media, is drastically scaling back its Internet operations. This follows a similar cost-cutting exercise in the UK, where the majority of staff in News Network (UK digital media company) were laid off.

In October 2000, the *New York Times* withdrew its planned IPO for its online component, New York Times Digital, due to weak market conditions.

However, many of the large media companies are making substantial investments in digital content services projects. For example, Universal Studios has implemented a DAM initiative for stills, publicity photos, artwork and trailers. Universal Music Group has teamed up with Akamai to offer Internet Programming services for broadband delivery of music using Windows Media, Real Networks and Apple's QuickTime Formats. CNN plans to convert its vast video library to digital form over the next five to seven years. The newly designed system will digitise, catalogue, store and distribute more than 120,000 hours of archived material.

Ireland

The digital content services sector in Ireland is underdeveloped compared to leading countries such as the US and UK. This is because there are no major international media companies with significant operations in Ireland. According to Enterprise Ireland's *ITS 2007 – Strategy for Ireland's High Tech Future*, Ireland has a base of companies involved in all media sub-sectors. They include music, television, radio, and film production, post production and distribution, to new media and web services.

The creation of the Digital Media District clustered around Media Lab Europe in Dublin, will build on the strength of existing players within the industry and enable high value-added media segments to grow rapidly. The objective is to exploit Ireland's creative talents and reputation in order to position Ireland's digital media sector firmly within the burgeoning media environment of the future.

DAM is an emerging market and there are opportunities for Irish companies to develop and to market enabling technologies for this sector. In addition, the infrastructure is now in place (in terms of international connectivity and Internet Data Centres) to enable Ireland to be used by multinational media companies as a location for the storage and distribution of "rich" media content to the US and Europe.

Key Actions

The following key actions are identified:

Action	Responsible
Encourage Irish software companies to create enabling technologies for DAM and DRM.	Enterprise Ireland
Seek to build relationships with international media and eLearning companies, and position Ireland as a centre for the delivery of rich digital content to both Europe and the US.	IDA
Encourage international media companies to locate their back-office functions for digital content services in Ireland.	IDA
Encourage the providers of netsourced DAM solutions to locate in Ireland.	IDA

3.4 Netsourcing/Data Centres

What is Netsourcing?

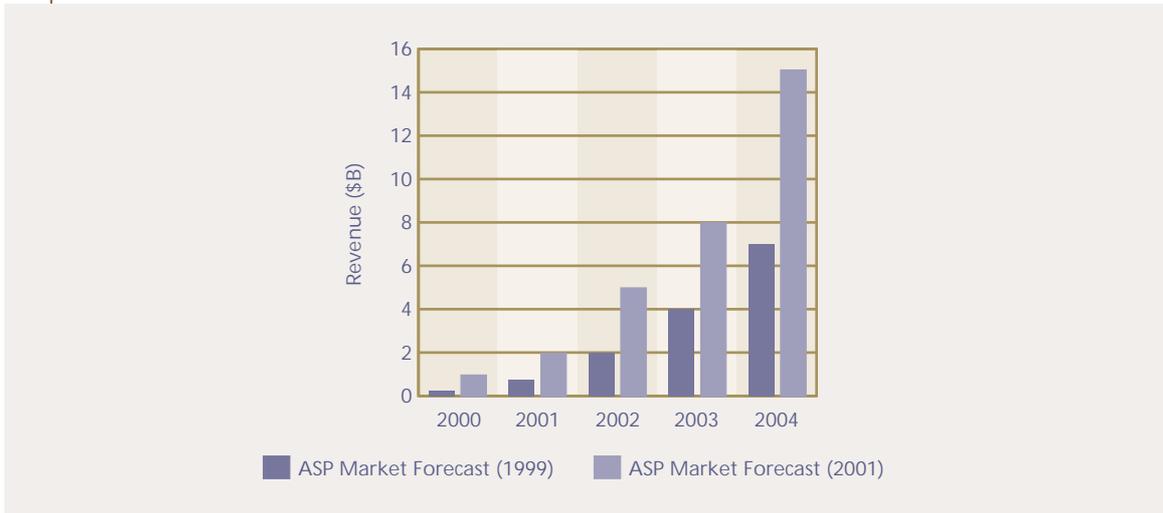
Netsourcing is the rental of business applications and processes, delivered by a third party over a network (usually the Internet). The third party is usually remote from the user and provides a common service to many businesses. Netsourcing thus covers both technology and business process outsourcing. With netsourcing, upfront licence and implementation charges are eliminated in favour of a monthly service charge.

Why is it Important?

Estimates of the potential size of the netsourcing market vary, but most analysts agree that the opportunity is significant. For example, Forrester Research estimates that the application hosting market will grow to €12.6bn by 2003⁴³; the Yankee Group estimates that by 2002 the enterprise applications hosting services market will be worth in excess of €11.1bn.

Despite the current slowdown IDC have adjusted their estimates upward for growth in this sector.

Figure 6 Upward Adjustment of Growth Projections for Application Service Providers (ASPs)



Source: IOC.

Netsourcing is important in an Irish context because the infrastructure needed for netsourcing is also required for major eBusiness operations such as the digital storage and distribution of software and content.

There are a number of factors driving the adoption of netsourcing. These include the reduction in the cost of bandwidth, the worldwide shortage of IT professionals, and the need for companies to roll-out IT capabilities swiftly. From an end-user perspective, netsourcing allows the business to leverage the technologies, processes and expertise of the leading providers of enterprise applications without having to make a large upfront investment. The savings for end-users can be considerable: netsourcing can save 80%-90% of the cost of building an internal hosted solution and 20%-30% of operating costs.⁴⁴

However, data centres – the physical facilities from which these services are delivered – require major capital investment. Accenture estimates that the capital cost of building a 100,000 sq ft data centre is in excess of €50m.

The take-up of netsourcing in Europe will be slower than in the US. Durlacher⁴⁵ estimates that by 2004, the European Application Service Provider (ASP)⁴⁶ market will be worth at least €1.6bn. Research by Ovum⁴⁷ indicates that the US is far more ASP-ready than Europe. In addition, Ovum found that large European corporations that run highly heterogeneous networks across different countries are particularly sceptical about ASP costs, predictability and reliability. This may be due to the fact that they are forced to rely on telecommunications transmission networks that are not as advanced as those in the US.

43 Forrester Research, *Sizing App. Hosting*, December 1999.

44 Internal Accenture Research.

45 Durlacher, *Application Service Providers (ASP) Report*, July 1999.

46 *Application Service Provider, a third party that supplies its customers with leased access to software hosted outside the end users physical location.*

47 Ovum, *Application Service Providers: Market Strategies For Telcos and ISPs*, 2000

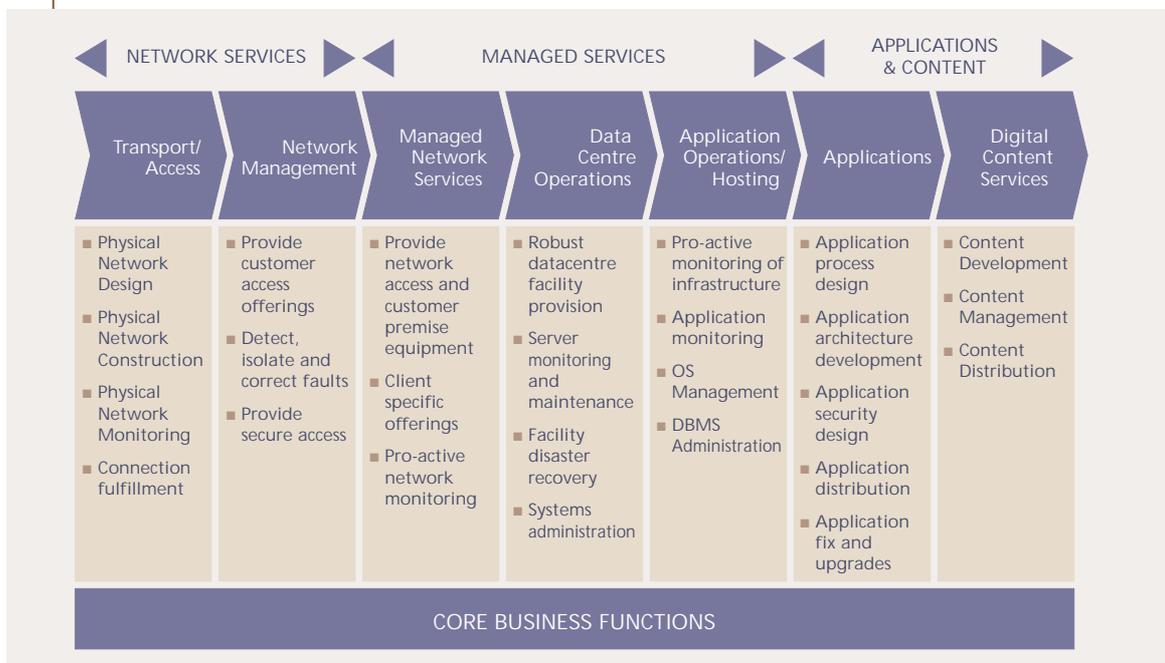
Value Chain – Netsourcing/Data Centres in the Wider Value Chain

Netsourcing includes the following range of services:

- ▶ *Business Service Provider (BSP) – a third party that supplies its customers with leased access to entire business processes such as Human Resource processes hosted outside of the end-users' physical location;*
- ▶ *Managed Services where the service provider takes over the management of the software application. Managed services can include monitoring of business applications, management of software elements such as middleware, application servers and operating systems, provision of hardware solutions and co-hosting facilities;*
- ▶ *Application Service Provider (ASP) – a third party that supplies its customers with leased access to software hosted outside the end-users' physical location;*
- ▶ *Hosting, shared – a large number of web sites hosted on a single server owned by the hosting provider and housed in a data centre;*
- ▶ *Hosting, dedicated – each customer has its own or multiple servers in one or more data centres to support mission-critical applications;*
- ▶ *Hosting, co-location – customers' existing equipment is moved from internally operated data centres to those operated by a third party.*

The physical facilities from which these services are delivered are Internet data centres. Internet data centres are secure facilities built by web-hosting and co-location providers to house and distribute customers' content. They contain racks of servers, data networking equipment, environmental controls, fire suppression systems and back-up power sources.

Figure 7 Wider Netsourcing Value Chain



Emerging Trends

Although the netsourcing industry is only just emerging, there is clear and compelling evidence of consolidation. Gartner predict that by 2004, only 20 of 480 European ASPs would remain as enterprise-class, full-service retail ASPs, while fewer than 100 will offer successful point product solutions because of bankruptcy, lack of venture capital, mergers, and traditional competition.⁴⁸

This consolidation will be driven by the need for ASPs to provide a greater range of applications and services in order to retain their customers.

At present, most ASP offerings are targeted at the SME sector. Future offerings, however, will provide Enterprise Resource Planning (ERP) applications to large corporates. Applications outsourcing will drive a trend towards multi-vendor solutions, where vendors try to lock up specialised skills and sales channels. Customers will also tend to outsource generic, non-competitive applications, such as back-office functions, human resources functions and so on.

Consolidation is impacting on data centre operators. Internationally, 360 Networks (June 2001) has filed for Chapter 11 protection and CityReach (August 2001) was placed in administration. Exodus Communications, the largest of the independent data centre operators, has filed for Chapter 11 bankruptcy protection.

Ireland

Consolidation, which is so much a feature of the international marketplace, is having an impact in Ireland with 360 Networks, CityReach, and Worldport ceasing operations in 2001. Domestic IDCs are also consolidating as Data Electronic acquired the assets of the Wolfe Group in January 2001. Accenture believes that there is significant overcapacity of data centre space in Ireland. According to Accenture, the total amount of data centre space in Ireland is somewhere between 300,000 and 500,000 sq. feet while current estimated domestic demand is between 100,000 and 130,000 sq. feet. Only those firms that have ready access to capital and are capable of moving up the value chain to provide managed services will be able to survive the wave of consolidation.

To assist the development of the netsourcing industry in Ireland it will be necessary to take measures to grow the market. Internationally, the IDA needs to continue to work closely with the industry players in order to market Ireland as a location for netsourcing activities. Domestically, Enterprise Ireland needs to educate the Irish marketplace as to the benefits of netsourcing for Irish business.

In addition, if the industry is to prosper in Ireland, data centre operators need to move up the value chain from the provision of co-location space to offering fully managed services. In some cases this will require the development of new skill sets by these companies. One method of accelerating this process is to encourage the setting up of alliances between data centre operators and technology service providers.

Key Actions

The following key actions are identified:

Action	Responsible
Educate Irish firms in the benefits of netsourcing, and, where appropriate, encourage firms to consider using netsourcing solutions.	Enterprise Ireland/IDA
Encourage the formation of alliances between Internet data centre operators and IT service providers in order to deliver managed services.	Enterprise Ireland/IDA

⁴⁸ Gartner Group, *The ASP Hype Cycle: Disillusionment Has Begun*, August 2000.

Voice Technologies

What are Voice Technologies?

Voice technologies are enabling technologies used to process human or machine-generated speech.

Voice technologies include:

- ▶ *Speech Recognition, which is the process of using complex statistical modelling for recognising what an individual person is saying;*
- ▶ *Dictation, computer transformation of speech into text for recording or control of software;*
- ▶ *Language Translation – this includes Machine Translation, which is the transformation of text from one language to another language;*
- ▶ *Speaker Recognition automatically recognises who is speaking by assessing the individual information included in speech signals. It consists of speaker identification and speaker verification or authentication. Speaker identification is the process of determining who is speaking, while voice authentication is the process of accepting or rejecting the identity claim of a speaker;*
- ▶ *Speech Analysis is the dissection of speech into its core components in order to obtain information;*
- ▶ *Speech Compression is the process of creating compact speech signals so that when it is reconstructed, it is perceived to be close to the original;*
- ▶ *Speech Synthesis is the production of an artificial voice by a computer.*

Why are these Important?

Although voice technology has been around for 5 to 10 years, it is now coming to the fore as a mainstream technology. Among the factors which are making it important now are:

- ▶ *The technology has become better. Speech recognition software engines are self-learning, which means that the more they are used the smarter they get because the statistical algorithms in their solutions have more examples to choose from. The leading technologies are now reaching accuracy of greater than 90% in multiple tonalities, language, accents and speaking rates. These solutions are now effective for mainstream use in a host of settings – indoor, outdoor, wired and wireless;*
- ▶ *Mobile Internet is of growing importance and voice technology can overcome the limitations of existing mobile devices;*
- ▶ *Voice technology can bring the Internet to the users of land-line phones;*
- ▶ *Voice enablement is the next generation of call centre applications. Interactive Voice Response (IVR) is the first wave of this, but IVR only provides one way of communication. The new wave of voice-enabled call centres will lead the way for the replacement of call centre agents.*

A report by the Kelsey Group⁴⁹ predicts that spending and revenues from voice applications will reach €45.6bn by 2005 from less than €5.6bn in 2001.

⁴⁹ Kelsey Group, Voice Web Study, March 2001.

Value Chain

Voice technologies are an emerging field and as yet it is difficult to classify the various elements. Based on the state of the market now, there are eight main types of players in the value chain for the use of voice technologies:

- ▶ *Application Developer – application developers create voice applications usually in Voice XML⁵⁰ and typically offer consulting services to voice-enabled organisations. Examples of application developers include Bluewireless and Lernout and Hauspie;*
- ▶ *Application Service Providers – application service providers host voice applications and may offer other services. Examples of ASPs include TellMe Networks and Vocal;*
- ▶ *Network/Platform Provider – major telecommunication companies have long offered voice services but are now tailoring their offerings to take emerging technologies into account;*
- ▶ *Security Provider – security providers offer both products and services in speaker identification;*
- ▶ *Speech Recognition Engine Providers – speech recognition is the dominant concept in voice technologies. Providers of speech recognition engines include IBM and Philips, which has the largest natural language portfolio (22 languages) and Nuance, providers of speech recognition and speech authentication software;*
- ▶ *Text to Speech Engine Providers – are provided by companies such as Fonix which supports voice solutions for wireless and mobile devices as well as Internet and telephony systems;*
- ▶ *Traditional IVR/Telephony – most established IVR companies have begun to provide voice services;*
- ▶ *Voice Browser Developer – voice browser developers create the software that interprets web site and application VoiceXML.*

Recent Trends

Among the trends are both barriers and drivers. Among the barriers to the rapid development of voice recognition software and services are:

- ▶ *Lack of Standards – Voice XML 1.0 is a very new standard and as such many vendors have based current offerings on custom proprietary extensions;*
- ▶ *High Cost – developing voice applications is an expensive process from a design perspective alone;*
- ▶ *Unsophisticated Devices – smart devices are still not intelligent enough to handle voice and data simultaneously. For the mobile user, speech recognition can exist only when connected. Devices of the future will need to have greater storage, faster processors and need to provide for disconnected use;*
- ▶ *Business Re-Alignment – businesses potentially face a strategic human resource issue by opting to replace call centre representatives with speech recognition systems;*
- ▶ *Cultural Attitudes – cultural attitudes represent the largest obstacles. For example, are people comfortable with voice verification as an identification mechanism, should speech be used in public places, will elderly people be comfortable talking to a computer?*

50 Voice XML is an extensible mark up language (XML) for the creation of automated speech (ASR) and interactive voice response (ASR), an interactive voice response (IVR) application.

Among the drivers of voice technologies are:

- ▶ *Revenue Generation – voice technology extends its reach to numerous devices and individuals. Voice enabling adds new service distribution channels creating v-commerce (voice-enabled commerce) opportunities. Also, additional value-added services increase the “connect minutes” of mobile customers for telecommunications companies;*
- ▶ *Cost Reduction – replacing or alleviating human operators with speech systems can significantly reduce business expenditures. Additionally, call centre agent turnover due to tedious routine calls can be reduced;*
- ▶ *Accessibility – voice technology is available on multiple devices which are becoming more prevalent;*
- ▶ *Security – voice verification provides an additional confidence factor for access to sensitive information;*
- ▶ *Efficiency – individuals prefer voice to DTMF⁵¹ interfaces when it comes to navigating long menu chains or specifying a choice from numerous options;*
- ▶ *Convenience – the use of natural language means that computer-illiterate individuals can access information without having to learn new skills.*

Ireland

The advent of voice technologies is important to Ireland for a number of reasons, both as an opportunity to develop new products and services and because of its potential to improve productivity in the call centre industry in Ireland. There are a number of companies in Ireland working on voice technologies, such as Buytel which specialises in voice authentication. However, the sector is underdeveloped when compared to the mCommerce sector as a whole.

Voice technologies are a key enabling technology for mCommerce and provide a less invasive biometrics security option than either fingerprints or retinal scans. As such, they represent a major opportunity for Irish firms. This view is supported by the decision of the Department of Public Enterprise to establish a task force to position Ireland as a centre for the biometrics industry.

Key Actions

The following key actions are identified:

Action	Responsible
Encourage Irish software companies to create voice technologies.	Enterprise Ireland
Examine the potential impact of voice technologies on the call centre industry in Ireland.	IDA/Enterprise Ireland

⁵¹ DTMF (Dual Tone Multiple Frequency), use of dial tone controls to access interactive services.

4 The eBusiness Environment

Introduction

This section identifies best practice internationally in providing the optimum environment for eBusiness, assesses the current Irish situation, and identifies key actions to close the gap.

The main pre-conditions for eBusiness are:

- ▶ *A supportive Government policy framework;*
- ▶ *The provision of on-line Government services or eGovernment;*
- ▶ *A supportive Legal and Regulatory Framework;*
- ▶ *Advanced Telecommunications Services;*
- ▶ *Competitive eBusiness Support Services;*
- ▶ *Supportive Financial Markets;*
- ▶ *High levels of Information and Communication Technologies (ICTs) adoption in business and society;*
- ▶ *High levels of Research, Development and Technological Innovation in Information and Communication Technologies and eBusiness areas.*

In each case, selected examples of international practice are given. The situation in Ireland in May 2000 (when the first eBusiness monitor was completed) is described and important developments since then are detailed. The critical challenges facing Ireland are described and actions that address these challenges are identified. The countries chosen for comparative purposes include the US, the UK, Nordic countries (Sweden, Finland and Norway), the Netherlands and Singapore.

In the section on support services, additional data is used about Canada; while in the section on financial environment, information is used on Israel.

4.1 Government Policy

Introduction

A supportive Government policy framework is critical to the ongoing development of eBusiness in Ireland.

Emerging Best Practices

Emerging best practices in government policy include:

- ▶ *Government eBusiness and Information Society strategies published, and progress on the implementation of that strategy measured on a regular basis. The strategy should cover issues such as:*
 - *Legal and regulatory issues;*
 - *eGovernment;*
 - *National Broadband Infrastructure;*
 - *ePayments;*
 - *Business (in particular SME) and consumer adoption of eBusiness;*
 - *Skills;*

- *ICT;*
- *R&D;*
- *The Digital Divide.*

- ▶ *The assignment of political responsibility for the overall implementation of the strategy and a clear governance structure, and sufficient resources to ensure speedy implementation of the strategy;*
- ▶ *A high level of awareness/buy-in from senior politicians and policy makers;*
- ▶ *Comprehensive steps taken to measure the economic impact of eBusiness;*
- ▶ *Programmes in place to encourage eBusiness (particularly SMEs) and consumer adoption of eBusiness and ICT, and to deal with the Digital Divide.*

Key International Developments – The US

In the US, the high-tech plan of President George W. Bush sets out three main goals:

- ▶ *To lift barriers to innovation and to fight efforts in the United States and overseas which impose new obstacles to trade and commerce;*
- ▶ *To help the US develop and maintain a workforce that is prepared to seize the opportunities of the high technology economy;*
- ▶ *To establish a stable environment that encourages research and innovation in the private sector and the military.*

The Bush administration also aims to reduce non-tariff barriers to trade in information technology, to step up efforts to combat piracy of ideas and intellectual property, and to promote the development of internationally compatible standards for eBusiness.

Other actions include:

- ▶ *Increasing the numbers of H-1B visas⁵² for skilled immigrants;*
- ▶ *Improving the educational system by giving greater powers to the individual states;*
- ▶ *Expanding the educational tax-free savings accounts;*
- ▶ *Supporting a permanent tax credit for R&D.*

Key International Developments – The UK

In the UK, the main thrust of government policy has been the implementation of the policies outlined in the 1999 report *eBusiness@its.best.uk*. In addition, the UK Government is building on the policies outlined in the *UK Online Annual Report*, which has five main headings:

- ▶ *Confident People – universal Internet access by 2005;*
- ▶ *Successful Business – UK small businesses to match the best in the world in the use of ICT by 2002 and to have one million SMEs trading online;*
- ▶ *Government as Exemplar – all government services to be online by 2005;*
- ▶ *World Class Supply – UK IT, electronics and communications sectors to have highest productivity and growth rates of the G7 countries by 2005;*
- ▶ *The Market Framework – UK to be the world's best business environment by 2002.*

Of the 113 committed initiatives announced since 1999, 108 are on track, 5 are completed, and none are behind schedule.

⁵² *The US H-1B visa program is designed to admit skilled foreign labour into the US.*

The UK Government has announced a series of fiscal incentives for eBusiness including:

- ▶ *100% first year capital allowances for investment in information and communication technologies;*
- ▶ *A tax-efficient, employee share-option scheme;*
- ▶ *A new enterprise management scheme to help small companies to recruit and to retain key personnel by granting favourable share-option packages;*
- ▶ *A package of major cuts to the capital gains tax;*
- ▶ *Discounts for electronic filing of tax returns;*
- ▶ *R&D tax credit for SMEs of 150% of the cost of R&D undertaken;*
- ▶ *A corporate venturing scheme to promote innovation by providing tax relief on investments in small, higher-risk trading companies.*

Key International Developments – Norway

The Norwegian Government's *eNorway Action Plan 2.0* (published December 2000) focuses on five main areas:

- ▶ *Culture and the environment – a particular focus of Norwegian concern is the need to protect the Norwegian and Sami languages;*
- ▶ *Lifelong learning – including training teachers in the use of ICTs;*
- ▶ *Industry – including the licensing of digital terrestrial television and assisting SMEs to adopt and to use eBusiness;*
- ▶ *Workforce – in particular assisting the disabled to participate;*
- ▶ *Public Sector – including e-enabling the health services.*

An interesting feature of Norway's strategy is that although it is not a member of the EU, it pays close attention to developments within the EU and implements EU directives into its own legislation. The *eNorway Action Plan 2* commits Norway to the full implementation of the *eEurope Action Plan*.

Key International Developments – The Netherlands

The Dutch Government's strategy is to build on the country's already strong ICT base, by creating a "Digital Delta". The focus is on the communications infrastructure, developing know-how and innovation, promoting Internet access and skills, regulation and the use of ICTs in the public sector. This policy was reviewed and updated in 2000 in the white paper *Progress Report on the Netherlands as a Digital Delta*⁵³.

Key International Developments – Sweden

The Swedish Government is using information technology to contribute to the growth in employment and to strengthen Sweden's competitiveness. Particular aims include ensuring that all citizens can enjoy the benefits of the information age, and to use information technology to develop the welfare state. Accordingly, Sweden uses tax incentives to encourage the purchase of PCs, and now has plans to invest over €950m⁵⁴ to ensure that 98% of all households have high-speed Internet access.

Key International Developments – Singapore

The Singaporean Government wants Singapore to be the electronic trading hub for South East Asia, aiming to have €2.46bn worth of goods and services transacted electronically by 2003 with 50% of all companies in Singapore doing some form of eBusiness by 2003. The Government's strategy has five main thrusts:

⁵³ *Progress report on the Dutch Digital Delta, October 2000.*

⁵⁴ *The Development of Broadband Access Platforms in Europe, Technologies, Services, Markets, August 2001 BDRC Ltd.*

- ▶ To develop an internationally linked eBusiness infrastructure;
- ▶ To jump-start Singapore as an eBusiness hub;
- ▶ To encourage business to use the Internet strategically;
- ▶ To promote usage by the public and by business;
- ▶ To harmonise cross-border eBusiness law and policies.

Key International Developments – eEurope

The European Council, held in Lisbon on 23-24 March 2000, set the objective for Europe to become the most competitive and dynamic economy in the world. It recognised an urgent need for Europe to exploit the opportunities of the new digital economy, and in particular the Internet.

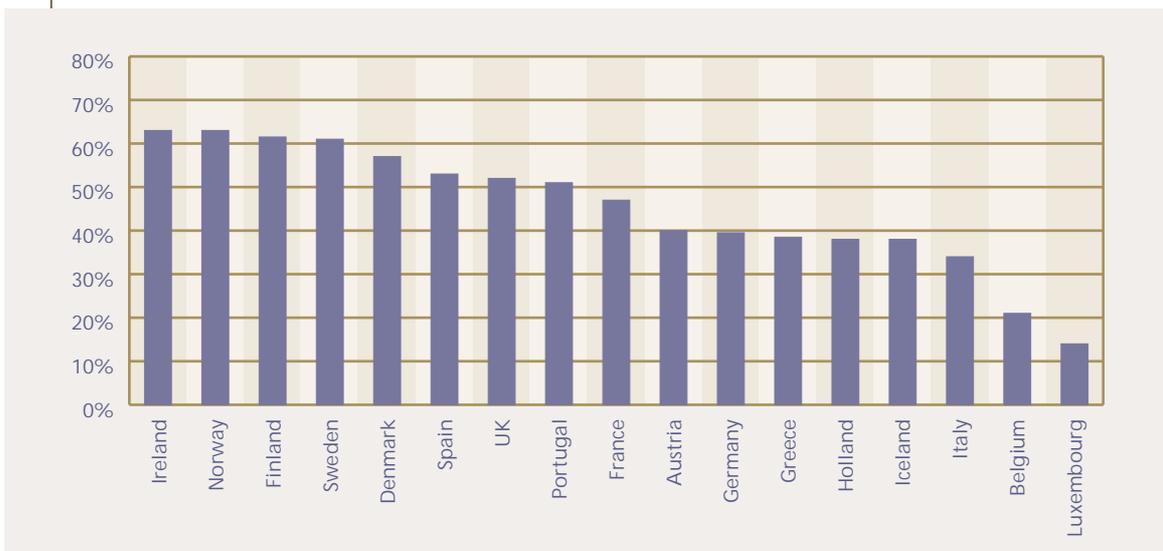
In June 2000, the European Council agreed the eEurope 2002 Action Plan, which contains a number of recommendations for implementation by the end of 2002, clustered around three main objectives:

A cheaper, faster, and more secure Internet	<ul style="list-style-type: none"> • Cheaper and faster Internet access • Faster Internet for researchers and students • Secure networks and smart cards
Investing in people and skills	<ul style="list-style-type: none"> • European youth in the digital age • Working in the knowledge-based economy • Participation for all in the knowledge-based economy
Stimulate the use of the Internet	<ul style="list-style-type: none"> • Accelerating eBusiness • Government online: electronic access to public services • Health online • European digital content for global networks • Intelligent transport systems

eEurope

The first eEurope eGovernment benchmarking survey of 20 basic electronic public services took place in October 2001. Topline results place Ireland strongly, as can be seen in Figure 8.

Figure 8 *Benchmark of eGovernment Facilities – Online Availability of Public Services*



Source: European Commission Report.

eEurope+⁵⁵, an action plan similar to eEurope, was launched in Göteborg in June 2001. This is a plan for the potential EU candidate countries that will adopt all the strategic goals and objectives of eEurope, and also includes each country's specific national measures and target dates.

Ireland

As of May 2000, the Government had published a strategy on the Information Society, *Implementing the Information Society In Ireland: An Action Plan* (published January 1999) as well as the report on eBusiness – eCommerce: *the Policy Requirements* (published in July 1999). The Information Society Commission established in 1997, had undertaken a number of awareness campaigns for business and the general public. In addition, the Department of Public Enterprise had announced a major investment of €76m in an international fibre optic connectivity project (Global Crossing) and the telecommunications market had been fully deregulated since November 1998.

Key Developments – Ireland

In Ireland, the primary focus of government policy has been the implementation of the Information Society Action Plan (published in January 1999). In particular, the Government has focused on the delivery of eGovernment through the eBroker, a single, accessible, user-friendly public access point to a wide programme of government/public services, programmes and schemes. All government departments are in the process of completing an eGovernment strategy, which will be used as input into the creation of the eBroker. The Government's 1999 Action Plan was revised and updated in early 2001 and a new action plan, 'New Connections', was published in March 2002.

In September 2001, the Department of Public Enterprise requested expressions of interest in a public-private partnership to create an "Atlantic Digital Corridor" in order to help address the lack of broadband infrastructure in the West of Ireland. The Department of Public Enterprise also allocated an initial €55m of NDP funds to address the regional priorities identified by Forfás and the development agencies.

The Department of Public Enterprise is administering the CAIT (Community Application of Information Technology) project to address the digital divide. This project is designed to demonstrate the innovative use of information and communication technologies by late adopter groups. Under the scheme, €5.3m was allocated to 71 community groups from around the country to promote the use of technology by late adopters in June 2001.

In addition, the Government has put in place a new set of structures to ensure greater co-ordination in the formulation and implementation of policy. These structures include:

- ▶ *a Cabinet Committee on the Information Society, chaired by the Taoiseach;*
- ▶ *a complementary eStrategy Group at Secretary General level;*
- ▶ *a new Information Society Commission; and*
- ▶ *an expanded Information Society Policy Unit (ISPU) in the Department of the Taoiseach.*

Government Policy – The Critical Challenges

Ireland has made significant progress over the last number of years in the area of Government policy and compares favourably with many of the world leaders in eBusiness. However, a number of areas need to be addressed as a matter of urgency.

One of the key challenges facing Ireland is to accelerate the roll-out of broadband infrastructure and services to the regions. This has been recognised by the Government, which has allocated in excess of €200 million under the National Development Plan to address this issue. However the efforts of the Department to address this issue have been hampered by the global downturn in the Telecommunications sector, which has led to severe capital rationing within the industry and meant

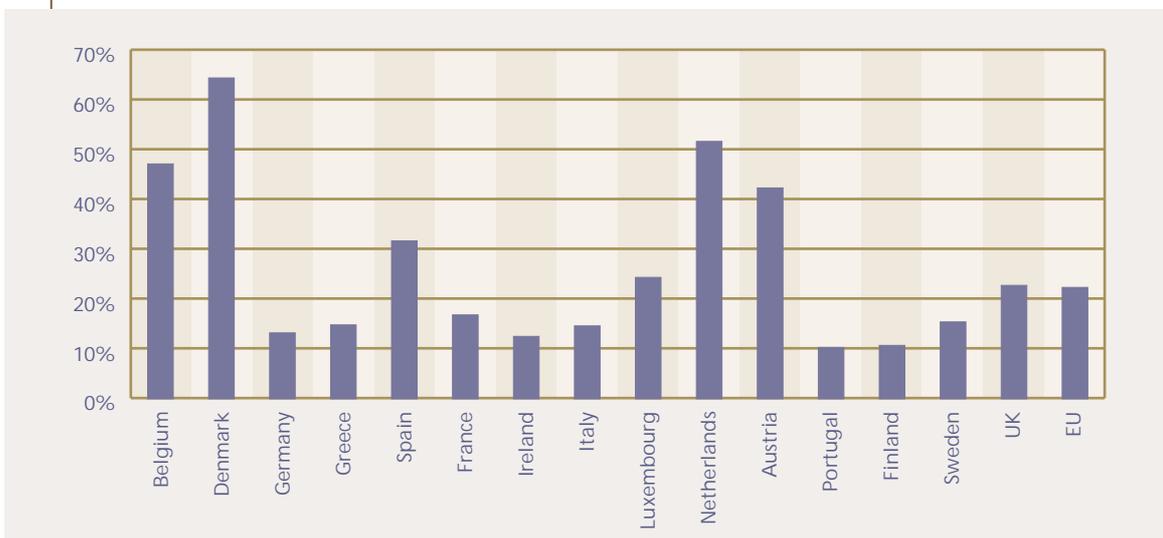
55 eEurope Action Plan: prepared by the candidate countries with the assistance of the European Commission, June 2001.

that Telecommunications operators have in some cases cancelled projects that are grant aided under the scheme. Following a review of progress in early 2002 the Government announced a National Broadband Investment Initiative. As part of this initiative fibre optic networks will be deployed in an initial 19 towns by local authorities in conjunction with telecommunications operators. Key issues include the effective, and co-ordinated, deployment of regional broadband infrastructures and services through the extension of open-access, diverse, resilient and advanced broadband and dark fibre backbone infrastructures further throughout Ireland and the development of competitive local access infrastructures for the provision of broadband services, including DSL. It is also critical that the planning guidelines for road openings are consistent and fair, that infrastructure sharing is encouraged, and where technically feasible, provision should be made for the bundling of ducting for telecommunications with other infrastructures including gas pipelines, new road building and along rail and power lines.

A 1998 study by Boston Consulting Group estimated that ePayments had the potential to save the Irish economy up to €350m a year⁵⁶. Since that report was published, there have been a number of developments in the ePayments area and it is likely that the potential savings to the economy may be greater than €350m. Given the benefits to the Irish economy and the danger of slipping behind competitor countries, it is critical that a comprehensive national ePayments strategy be put in place, and implemented as a matter of urgency.

One of the major issues facing Government as a whole is the need to improve the standard of Healthcare in Ireland and to ensure that the Health Service delivers value for money. The use of eBusiness technologies could have an important part to play in improving information sharing and reducing costs within the Health Service. Despite Ireland's strong standing overall, eHealthcare is less well developed in Ireland, as can be seen below.

Figure 9 *eBusiness and Health – Percentage of Online Medical Practices using the Internet to Transfer Patient Identifiable Data, June 2001*



Source: European Commission (Flash Eurobarometer), June 2001.

There is a need to develop an overarching legislative strategy for eBusiness, which will enable Ireland to create a distinct legislative position within the framework laid down by EU directives, based on a shared understanding of the Government's strategic intent by all Government departments, and that due priority is given to eBusiness related legislation.

Finally, there is a need to ensure that Ireland leverages the progress that it makes in creating a supportive environment for eBusiness and in implementing eGovernment through effective marketing.

⁵⁶ Boston Consulting Group, *Developing a National Payments Strategy for Ireland*, 27 November 1998.

Key Actions

The following actions are identified:

Action	Responsible
Set out clear deadlines for the implementation of eBusiness policies and publish progress reports on a regular basis.	Department of the Taoiseach/ Department of Enterprise, Trade and Employment
Create and implement a national ePayments Strategy.	Department of the Taoiseach
Formulate a comprehensive eHealthcare strategy.	Department of Health and Children
Continue to encourage the adoption of eBusiness by Irish businesses and the implementation of eGovernment.	Department of the Taoiseach/ Department of Enterprise, Trade and Employment/ Department of Communications and Natural Resources/Forfás
Develop comprehensive public web site pages to inform both the international marketplace and Irish businesses of progress on implementing eBusiness/eGovernment goals and targets achieved.	Government

4.2

eGovernment

Introduction

eGovernment is the application of the tools and techniques of eBusiness to the work of Government. By providing services electronically, a government can act as exemplar of eBusiness to the private sector. By using eProcurement, the Government can also create an online market, which can act as a powerful inducement to companies. This is of particular value to SMEs as it prompts them to go online in order to sell goods and services to Government departments and agencies.

The use of new technology systems has the potential to improve the way Government delivers its services both in terms of speed and efficiency, and has the capacity to bring Government closer to the citizen. eGovernment will enhance the business community's and the citizen's access to Government information and services, and will speed up standard administrative processes. It can also provide new ways to increase citizen participation in the democratic process.

Globally, eGovernment is at an early stage in its development, and falls behind progress in the enterprise sector. However, a number of countries are moving towards "connected government", that is, government using an approach which structures services around a particular goal, such as starting a business. The sharing and integrating of processes across departments and the creation of alliances with private sector partners to deliver selected services at lower costs are characteristics of "connected government".

Emerging Best Practices

Emerging best practices in eGovernment include:

- ▶ *Significant number of transactional services available to business and public;*
- ▶ *Use of eProcurement to encourage SMEs to go online to win Government business;*
- ▶ *Specific targets set for electronic government-to-citizen and government-to-business transactions.*

Progress to connected government is characterised by the following:

- ▶ *Intentions-based approach which structures services around a particular end goal such as starting a business;*
- ▶ *Sharing and integrating processes across departments;*
- ▶ *Using alliances with private sector partners to deliver selected services;*
- ▶ *Use of shared services to cut the cost and increase the quality of services delivered both externally and internally.*

Key International Developments – the US

As part of his Budget Blueprint for 2001,⁵⁷ President Bush has indicated his commitment to using eGovernment to save money and promote efficiency in government.

The agenda repeats previous eGovernment commitments such as the Interagency Task Force headed by Mark Forman, Director of Information Technology and eGovernment at the Office of Management and Budget (OMB). There is also a €22.3m eGovernment fund for 2002, which is part of an overall €111.4m fund set to last until 2004.

The agenda sets out new commitments including:

- ▶ *Expanding the FirstGov Web Site (www.firstgov.gov). The OMB will work with federal agencies, state and local governments in order to help citizens to find information and to obtain services organised “according to their needs, not according to the divisions created by the Government’s organisational chart”;*
- ▶ *The creation of a federal Public Key Infrastructure (PKI) to promote the use of digital signatures within the government, between government and businesses and between government and citizens. The initiative “should be co-ordinated with state and local governments as well as the private sector”;*
- ▶ *All agencies using a single eProcurement portal by the end of 2002 to provide access to notices of deals worth over €27,844. The Government-wide Internet entry point is “a first step in capitalising on electronic business processes and making eProcurement the government-wide standard”. Agencies will then use it “to consolidate procurement on the way to the broader eGovernment goal of supply chain management”;*
- ▶ *Applicants for federal grants to apply for and manage them online;*
- ▶ *Major regulatory agencies using the Internet to inform citizens of cases, allowing access to the development of rules, and making decisions more transparent.*

Key International Developments – The UK

One of the strongest themes in the UK strategy is the use of Government as an exemplar of eBusiness, and it has introduced a number of initiatives to implement this including:

- ▶ *The online Citizen Portal (www.ukonline.gov.uk) – this site connects all Government departments and agencies available online. It has a search and query facility called Quick Find and an area called the Citizen Space which helps people find out about Government plans, allows users to take part in public consultations, and provides information on elected officials and on registering to vote;*

⁵⁷ A Blueprint for New Beginnings, February 2001, additional material from Federal Computer Week, 26 March.

► *The Government Gateway (www.gateway.gov.uk) – developed by Microsoft, this is a system for signing XML documents over the Internet and is a self-contained piece of secure infrastructure, with intelligent routing and authentication software.*

In August 2001, the Government announced that it had signed an agreement with Microsoft to sell on the underlying technology behind the Government Gateway for 25% of the licensing fee paid to Microsoft.

The UK Government claims that 42% of central government services are now available online, well in excess of the interim target of 25% of services online by 2002.

Key International Developments – The Netherlands

As part of the strategy outlined in the white paper, *Progress Report on the Netherlands as a Digital Delta*, the Dutch Government has created a web site (www.overheid.nl) that serves as a guide when searching for Dutch Governmental institutions and documentation on the Internet. The web site incorporates sites of organisations closely affiliated with the Dutch Government, such as libraries, schools, and health-care institutions.

The objective of the www.overheid.nl web site is to provide simple and reliable access to all online information from the Dutch Government. The site is an initiative of the Ministry of the Interior and Kingdom Relations, the Minister for Urban Policy and Integration of Ethnic Minorities.

Key International Developments – Finland

Finland has a number of unique advantages when it comes to eGovernment. All Finns have a unique identification number that private companies also use. An important source of data about “life episodes” is the Church, as 98% of people belong to one or other of the two churches. Parishes help to update state databases by providing data on births, marriages and deaths.

Citizens of Finland received pre-filled tax declarations in 2001. They didn't receive any census forms. The tax and census authorities draw the information they need from shared Government databases. According to the country's Chief Information Officer, the core principle is to “update once, use everywhere”. When people move house, they need notify only one Government department; when patients are admitted to hospital, their file already contains details such as next of kin.

The tax office draws information about income and social circumstances from multiple databases and posts each taxpayer a pre-filled declaration, which most just have to sign and return. Since 1985, taking a “snapshot” from 30 government databases has fulfilled the function of the five-yearly census.

However, Finland has had difficulty persuading its citizens to buy the electronic identity cards, which simplify access to public services. According to a report by the Finnish Information Society Board⁵⁸, only 10,000 of Finland's population of 5 million had purchased the electronic ID cards, which can be used to sign the secure messages needed to obtain eGovernment services. The report blamed a lack of Government services requiring strong identification as the major reason behind the low uptake of the cards – currently, only 20 eGovernment services require the use of the card. The report also expressed the belief that the availability of Government services alone would not drive the use of electronic ID cards and unless the public were required to use the cards for private sector services, it was unlikely that the cards would achieve significant penetration.

Key International Developments – Sweden

Sweden is implementing its SHS (Partnership System), driven by the Swedish Inland Revenue Service, which is installing a PKI system to enable all citizens and businesses to identify themselves electronically.

⁵⁸ *KableNet.com, Finland Card Gets the Cold Shoulder, October 2001.*

Key International Developments – Singapore

The Singaporean strategy, "The eGovernment Action Plan", is building on existing eGovernment initiatives, which in June 2000 had over 130 services online. The Singapore eCitizen web site (www.ecitizen.gov.sg) provides a portal for all Government services and offers a vivid illustration of the potential of connected Government. However, real functionality of services within the web site has yet to be fully implemented. Since August 2001, Singapore allows citizens to pay for Government services online.

Ireland

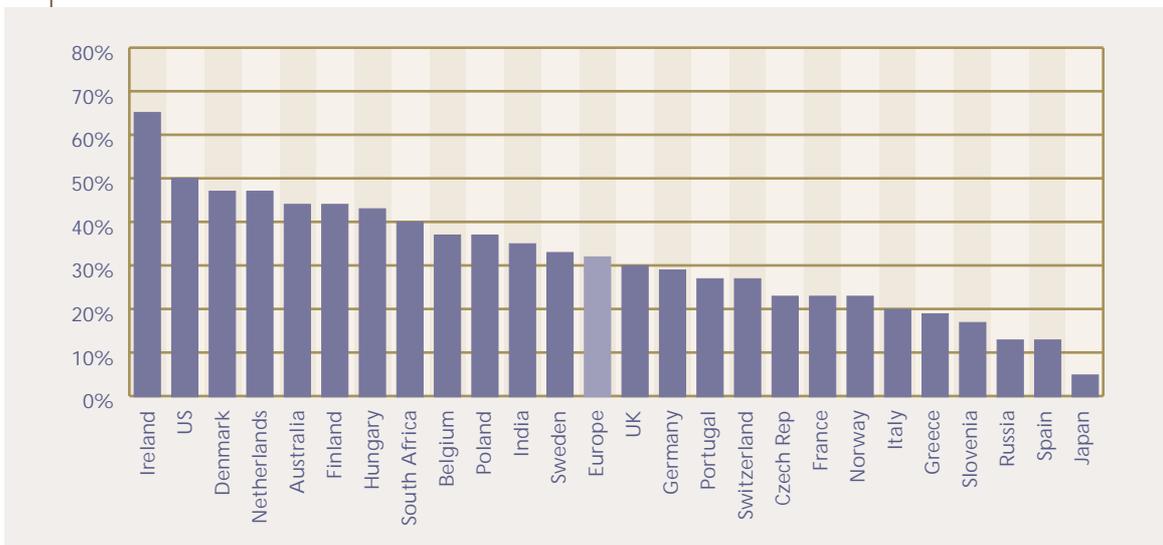
In May 2000, electronic government in Ireland was at a very early stage in its development. While most Government departments were using the Internet to publish and to disseminate information, there were very few interactive services available to the public. The Land ITRIS Registry, which went live in August 1999, has an Electronic Access Service that provides online searches of folios and related indices databases.

Key Developments – Ireland

The Irish Government is committed to positioning Ireland as a leader in the adoption of eGovernment. In the last year, considerable progress has been made in turning that commitment into a reality.

The Accenture report, "The Unexpected eEurope",⁵⁹ found that 65% of Irish executives believed that the Irish Government is an exemplar of eGovernment. This was the highest response from the 25 countries surveyed.

Figure 10 *Agreement that your Government has been an Exemplar of eCommerce*



Source: Accenture.

In addition, figures from the eEurope eGovernment benchmarking exercise in October 2001 note that Ireland secured the lead position in Europe in eGovernment as outlined in Figure 8. The survey covered 17 countries: the 15 member states of the EU, Iceland, and Norway. The European Commission based the survey on twenty basic public services:

- ▶ *Twelve public services aimed at individual citizens;*
- ▶ *Eight public services aimed at businesses.*

⁵⁹ "The Unexpected eEurope" Accenture October 2000.

The objective of eGovernment (the electronic delivery of government services in Ireland) is to enable citizens to access Government services at a time and a place of their choosing. This will enable Government to provide services more efficiently and cost-effectively, with less red tape for public service customers, and to drive business and consumer adoption of the Internet. The mechanism that the Government will use to provide these services is the Public Services Broker or eBroker, which will provide a single electronic point of contact for government services.

The information elements of the eBroker have been created by the OASIS (for citizens) and BASIS (Business Access to State Information and Services) projects. OASIS is a web site with information for citizens organised around "life episodes". BASIS is a web site for businesses organised around "business episodes". The Government is now actively looking at the integration of these two web sites.

In addition, registration and basic authentication services are currently available on a pilot system, which went live on October 2001 and which support a number of services such as applying for child benefit.

In addition, the following initiatives are being implemented:

- ▶ *The Revenue Online Service (ROS) project was launched in November 2000. ROS provides an efficient and secure means of transacting business with the Revenue Commissioners, facilitating prompt processing and allowing for access to tax information outside of business hours. In the first 12 months of its operation, 8,000 customers registered for the service, and 4,000 businesses have received digital certificates. They have electronically filed 30,000 returns and they have made electronic tax payments to the value of almost €1.5bn. ROS is to be expanded further, and the objective is to have 50% of business returns filed using ROS by 2005;*
- ▶ *FÁS had launched its Electronic Market Internet Service in February 2001. It enables employers to input job vacancies online. Job seekers can input their CVs and apply for jobs online;*
- ▶ *The Department of Social Community and Family Affairs is progressing the General Register Office (GRO) project, an initiative to modernise the citizen registration process for "vital life events" such as births, deaths and marriages. This system will enable online registration and ensure that the relevant certified information is accessible and shared, as appropriate, across public service agencies. The system is expected to go live in 2002;*
- ▶ *REACH and the Department of the Taoiseach have commissioned projects to facilitate a common understanding of departmental eGovernment strategies. They have also commissioned a process to integrate these strategies within the REACH and eBroker initiatives. These strategies are being catalogued and are being made available within the public service;*
- ▶ *The Centre for Management and Organisational Development (CMOD) in the Department of Finance has begun to consider the opportunities to develop e-enabled collaborative working within the public service in areas such as the drafting of legislation;*
- ▶ *An eProcurement strategy for Government has been developed. In the interim, a public sector tenders portal called e-tenders.gov.ie was launched in mid-2001.*

eGovernment The Critical Challenges

The implementation of eProcurement by Government is critical to encouraging Irish SMEs to adopt eBusiness. The total non-payroll spending for the Public Sector (excluding Commercial State Bodies), based on the Estimates and Votes for 2001⁶⁰, is approximately €10.2bn. By procuring online, the Government would actually create a large online marketplace, which would encourage SMEs to go online in order to trade with Government.

⁶⁰ Department of Finance; Revised Estimates for Public Services, 2001.

Because of its size, there is a real opportunity for Ireland to leapfrog competitors in the implementation of eGovernment. In terms of conceptual thinking on eGovernment, Ireland compares very favourably with other countries. However, it is the speed of implementation that will determine whether Ireland gains a competitive advantage from the implementation of eGovernment, and it is thus imperative that these initiatives are progressed as vigorously as possible.

Delivering on Ireland's eBusiness agenda will require convergence and close collaboration between hitherto discrete Government departments and public agencies.

One of the critical challenges, which must be addressed, is the need to create an enhanced governance structure for eGovernment in Ireland. Currently, the overall responsibility for co-ordinating the delivery of eGovernment services in Ireland rests with the REACH agency, which reports to the Department of Social Community and Family Affairs. However, the REACH agency does not have a board from which the director of REACH can seek guidance on strategic matters. An agency board with representatives of the Department of the Taoiseach, CMOD, and a number of the key departments chaired by an independent chairperson would help to provide REACH with advice and strategic direction.

It is also likely that REACH will need greater resources if it is to effectively and speedily fulfil its mandate.

Key Actions

The following actions are identified:

Action	Responsible
Set out an aggressive timetable for the implementation of the eBroker initiative.	Government
Put in place an enhanced governance structure for the co-ordinated delivery of eGovernment services.	Department of the Taoiseach
Ensure that the REACH team has adequate resources to fulfil its mandate.	Government
Prioritise an eProcurement programme for Government as a flagship.	Department of Finance
Put in place a structured communications programme to explain the benefits of eGovernment to all stakeholders.	REACH

4.3

Legal and Regulatory

Introduction

People transacting business electronically want to feel confident that they have the same legal protection online as offline. Many governments worldwide are working to produce a supportive legal framework for eBusiness. However, international bodies such as the EU and national governments are taking diverse approaches to creating a supportive legal framework for eBusiness. There is still major disagreement about the rights of security organisations to monitor communications between individual citizens and businesses, and about the best ways of ensuring adequate consumer protection. The tragic events of 11 September in New York have already led to a number of calls for increasing the powers of security agencies to monitor electronic communications. For example, in the United Kingdom new Government proposals would oblige companies to retain email records for up to 12 months.

From an Irish perspective, it is essential that Irish legislation is business-friendly, and that, the Irish legal environment remains the closest to that of the US, compared to its EU partners. This will provide Ireland with a competitive advantage vis-à-vis our European competitors in attracting US firms to locate their European operations in Ireland. It is now clear that a pro-business legal and regulatory environment can be a potent source of competitive advantage for nations competing for foreign direct investment.

As of May 2001, countries as diverse as Argentina, Denmark, Israel, Germany, France, Japan, Portugal, and Ireland had all enacted legislation governing digital signatures.

A number of governments are attempting to legislate for the interception of electronic communications, although the debate regarding privacy on the Internet is far from over. In Europe, the EU has played a critical role in driving the legislative agenda. The Directive on Digital Signatures was adopted in November 1999, to be incorporated into national legislation by July 2001. The eBusiness directive was adopted in May 2000, and member states have 18 months in which to incorporate it into national law. The aim of EU legislation is to create a common legal framework for eBusiness within the EU.

In June 2001, the Council of European Justice Ministers agreed the final draft of its new treaty on cyber crime. The most significant change in this treaty is the inclusion of two sections on interception of communications and traffic data. These had been listed as "under discussion" in the previous draft. The two sections require countries to adopt laws to "compel a service provider" to either capture content themselves by building in surveillance capabilities, or to "co-operate and assist" authorities. The draft treaty has been widely criticised by privacy and civil rights advocates, including the Irish Internet Association⁶¹, which has highlighted the danger of overreaction to terrorist atrocities. Mr Philip Nolan, a solicitor from Mason Hayes and Curran, pointed out that the Government could delay the convention implementation "...because it is an international treaty, and not a piece of EU legislation, there exists no international enforcement body which will compel the Irish Government to implement the convention".⁶²

Emerging Best Practices

A number of emerging best practices can be discerned in the area of eBusiness legislation and regulation. These include:

- ▶ *A legislative approach focusing on using legislation to create a competitive telecoms market and secure information infrastructure, and the creation of a supportive legal framework for eBusiness;*
- ▶ *"Light touch" technology, neutral legislation in place governing electronic signatures, contracts, regulation of certification authorities, encryption, cyber crime, data protection, consumer protection, eMoney and content liability;*
- ▶ *Copyright – World Intellectual Property Organisation (WIPO) treaties signed and implemented;*
- ▶ *Judicial competence developed in information technology, eBusiness, and intellectual law.*

Key International Developments – The US

The US has been reluctant to legislate specifically for eBusiness. For example, on the issues of consumer protection and privacy, the Government has preferred to use industry self-regulation and existing consumer law rather than introduce new laws. Encryption policy has been relaxed to some extent to allow US firms to sell strong encryption products abroad.

⁶¹ Irish Internet Association, *Position paper on email and Internet monitoring and surveillance*. 11 November 2001.

⁶² Irish Times, "State faces decision on cyber crime convention", 9 November 2001.

The US eSignature Act, enacted in May 2000, and effective from October 2000, states that with few exceptions, an electronic signature is just as valid as a regular signature for all forms of commerce including insurance, consumer goods and financial transactions.

Other legislation of interest includes:

- ▶ *The eGovernment Act 2001: this Act introduced in May 2001⁶³ seeks to enhance the management and promotion of electronic government services and processes by establishing a Federal Chief Information Officer within the Office of Management and Budget. It also establishes a broad framework of measures that require the use of Internet-based information technology to enhance citizen access to Government information and services and for other purposes;*
- ▶ *USA Patriot Act, which was passed in October 2001, enhances the Government's ability to conduct surveillance and gather intelligence including "dialling, routing, addressing and signalling information" for Internet traffic. The provisions of the Act have been widely criticised by civil rights activists;*
- ▶ *Identity Theft Prevention Act 2001: this is an act designed to make it illegal to steal another person's identity, a growing problem in the United States.*

Key International Developments – The UK

In the UK, the Electronic Communications Act 2000 governs electronic signatures and encourages the development of secure and trusted eBusiness services.

In July 2000, the Regulation of Investigatory Powers Act (RIP) received Royal Assent. The Act makes some concessions to industry on the issue of disclosure of decryption keys and on the costs of installing surveillance technology; €32.52m has been allocated to help Internet service providers develop the capability for the lawful interception of Internet protocol communications. Ireland's competitive position is boosted by the controversy surrounding the RIP Act in the UK. Trust UK was also launched at the same time; this is a scheme to encourage consumer trust in eBusiness through industry self-regulation and the use of a hallmark symbol on sites.

Proposals have been put before Parliament for new legislation that will allow companies to communicate information electronically with shareholders. These proposals will remove some of the legal obstacles to communicating electronically, and companies will be able to fulfil their obligation to send shareholders their annual report and accounts, subject to their agreement, by electronic means. This is the first order to be laid before Parliament under Section 8 of the Electronic Communications Act 2000.

Key International Developments – Nordics

- ▶ *In November 2000, the Swedish Act on Electronic Signatures was passed. This came into force in January 2001.*
- ▶ *In May 2001, the Electronic Signatures Act was passed by the Norwegian Parliament and came into force in July 2001.*

Key International Developments – Singapore

Singapore's Electronic Transactions Act came into force in September 1998. This Act, one of the first of its kind, governed electronic contracts including electronic records and signatures and the role of certification authorities.

⁶³ The eGovernment Act 2001 had not yet been passed when the research for this report was completed.

Key International Developments – EU

In Europe, there are diverging views on the most appropriate legal and regulatory environment. Broadly speaking, the critical debates involve:

- ▶ *Balancing consumer rights with the needs of the enterprise sector;*
- ▶ *Balancing business and consumer privacy rights with the needs of law enforcement bodies.*

Given the international nature of eBusiness, these debates are currently taking place within and between governments. It is critical that a clear and co-ordinated strategy is in place to balance the rights of all interested parties. On 8 November 2001, the Council of Europe approved the Convention on Cyber Crime, a treaty designed to harmonise laws against crimes committed on the Internet.

Ireland 2000

As of May 2000, the Electronic Commerce Bill 2000, had yet to be passed. The Copyright and Related Matters Bill 1999 was in the committee stage in the Oireachtas, and the Data Protection Bill 2000 was being drafted. In addition, there were a number of EU Directives such as the Protection of Consumers in Respect of Distance Contracts (97/7/EC) which had yet to be implemented into Irish law.

Key Developments – Ireland

Significant progress has been made since May 2000 on legal and regulatory issues, notably through the passing of the eCommerce Act 2000 and the Copyright Act 2000. The Broadcasting Act 2001, sets out the regulatory framework for digital terrestrial television in Ireland. The passage of the acts mentioned above has significantly improved the legal and regulatory environment for eBusiness in Ireland.

In November 2001, the Department of the Taoiseach established the Inter-Departmental Group on Information Society Legislation to co-ordinate eBusiness legislation.

Legal and Regulatory – The Critical Challenges

If Ireland is to use legislation as a means of achieving competitive advantage in eBusiness it is essential that the Irish Government create an overarching legislative strategy. Such a strategy would mean that all government departments would operate with a shared understanding of the Government's overall intent rather than approaching legislation from a narrow departmental or sectoral perspective. It would ensure that the adoption of EU Directives into Irish law would be done in a manner, which would enable Ireland to use the optimum flexibility in the interpretation of the EU directives and to develop distinctive approaches to the incorporation of such directives into Irish law.

A legislative strategy would also ensure that eBusiness legislation was given due priority in the Government's legislative agenda as being of strategic importance to the Irish economy and would help to ensure the timely passage of eBusiness-related Bills.

In practice, the development of an eBusiness legislative strategy would be greatly assisted by the setting up of a legislative forum to enable policymakers, lawyers and industry to discuss eBusiness legislation and to ensure a co-ordinated and business-friendly approach to domestic regulation and EU directives.

A practical example of the dangers posed by the lack of a legislative strategy are the issues raised by the European Convention on Cyber Crime. From a Justice perspective, the swift adoption of this treaty might seem desirable. However, the Irish Internet Association has already expressed reservations about some of the measures in the treaty, which would impose additional costs on service providers. It is also critical that the proposed Data Protection Bill 2001 is enacted in a business friendly way.

The Government also needs to ensure that it possesses a strong proactive lobbying presence in Brussels to shape the development of EU directives at the earliest possible stage.

However, excellent legislation is only one element. It needs to be supported by the development of experience in information technology, eBusiness, and Intellectual Property law within the judiciary. Already, for example, the UK is gaining a reputation as a centre for judicial excellence in intellectual property law. The Judiciary could assist in this process by selecting and providing special training for a number of judges who would then adjudicate in cases involving these topics.

Digital TV may well be the means by which the majority of Irish citizens access interactive services. The Department of Arts, Culture, Gaeltacht and the Islands is currently selecting an operator to provide the platform for Digital Terrestrial Television (DTT) in Ireland. However, the regulations, which govern the provision of services, will be determined by the Commission for Communications Regulation. To ensure that the maximum benefit is gained from DTT, it is essential that the regulatory regime encourage the provision of interactive services such as email and Internet access.

The process for applying for .ie domain names has been criticised by some industry sources as being cumbersome and time-consuming. While the situation has clearly improved, the Government should continue to encourage the IE Domain Registry to improve its services to business.

Key Actions

The following actions are identified:

Action	Responsible
<p>Create an overarching strategy for eBusiness legislation in Ireland, which focuses on creating competitive advantage for Ireland through appropriate legislation. Among the elements which this strategy must address are to:</p> <ul style="list-style-type: none"> • Create a forum to enable policymakers, legislators, and industry to discuss eBusiness to ensure a co-ordinated and business-friendly approach to domestic regulation and EU directives • Create a proactive regulatory environment in Ireland to help shape EU legislation and establish a strong lobbying organisation in Brussels to shape EU directives at an early stage • Identify a distinctive approach to the incorporation of EU directives into Irish law in order to gain competitive advantage. 	<p>Department of the Taoiseach/ Department of Enterprise, Trade and Employment/Department of Communications and Natural Resources/Department of Justice, Equality and Law Reform</p>
<p>Select and provide special training for a number of judges who would then adjudicate on cases involving information technology and intellectual property law</p>	<p>Judiciary</p>
<p>Ensure the licensing regime for Digital Terrestrial Television encourages the deployment and use of interactive services.</p>	<p>Commission for Communications Regulation/Department of Arts, Culture, Gaeltacht and the Islands</p>
<p>Assess the possibility of creating another domain name registry in Ireland to promote competition.</p>	<p>Department of Communications and Natural Resources</p>
<p>Ensure that IE Domain Registry Ltd continues its drive to create a more business-friendly service for Irish business.</p>	<p>Department of Communications and Natural Resources</p>

Support Services

Introduction

This factor refers to support services for eBusiness. The leading country is the USA.

Support services include:

- ▶ *Internet infrastructure and services such as secure data centres, web site and application management services;*
- ▶ *Consultancy services;*
- ▶ *Business-to-business marketplaces;*
- ▶ *End-to-end eBusiness solutions, which provide SMEs with everything from assistance in creating a web site, to logistics and order fulfilment.*

This report does not focus on telecommunications in detail. Forfás has a separate project that benchmarks Ireland's telecommunications sector against international best practice. This section, therefore, concentrates on developments in the Internet data centres, managed services, and other eBusiness services providers.

Netsourcing

Netsourcing is the rental of business applications and processes, delivered by a third party remote from the user, and providing a common service to many businesses. Netsourcing covers both technology and business process outsourcing, and has been enabled by the development of Internet Data Centres. These centres are secure facilities built by web hosting and co-location providers to house and to distribute customers' content. They contain racks of servers, data networking equipment, environmental controls, fire suppression systems and back-up power systems. As the rental of co-location space has become a commodity, more and more operators of data centres are attempting to move up the value chain by providing managed services such as storage and security.

Electronic Payments

In a number of countries, the Government has played an important role in promoting electronic payment infrastructure to enhance national competitiveness by improving transactional efficiency in the economy and by creating a robust infrastructure to support future eBusiness initiatives.

In many of the leading countries, the relatively small size of the marketplace has led to a high degree of collaboration between Government, Government agencies, banks, utility companies and other industry players. This collaborative approach has ensured that the required infrastructure investments benefited from economies of scale and scope and that different industry players shared the investment. At the same time, a regulatory framework was established in the successful countries that defines the boundaries between collaborative infrastructure development and the competition between the industry players necessary to provide end-users, such as consumers and businesses, with greater choice, superior quality and greater price transparency.

Successful countries have also developed their payment infrastructure with multi-channel capability, enabling them to support electronic payments in the real world by using chip-enabled cards, Electronic Data Interchange (EDI), file transfer, and PC-based proprietary software, as well as electronic payment initiation through PC-based Internet.

Electronic Marketplaces

B2B electronic marketplaces are marketplaces that bring buyers and sellers together in a digital forum to:

- ▶ *Conduct pre-sales activity;*
- ▶ *Transact sales;*
- ▶ *Complete post-sale activity.*

Emerging Best Practices

Internationally, the area of Support Services has undergone dramatic changes. The sector has been swept by waves of consolidation, driven in part by the dot-com implosion and the stock market correction. In the period from May 2000 to October 2001, Ireland made very significant improvements in this area. However, there exists a real danger that these gains may now be lost due to international consolidation in the sector.

Emerging best practices in Support Services include:

- ▶ *Competitively-priced national broadband infrastructure with technical and carrier diversity;*
- ▶ *Ready availability of "low-cost, always-on" access for SMEs;*
- ▶ *Competitively priced co-location services;*
- ▶ *Presence of a variety of new Internet infrastructure and service providers, such as providers of secure data centres, and web site and application management services;*
- ▶ *Presence of Managed Services operators in the marketplace;*
- ▶ *Establishment of B2B marketplaces and exchanges;*
- ▶ *Movement towards greater use of electronic payments;*
- ▶ *Credit card clearance at competitive business rates.*

Key International Developments – Netsourcing

Significant consolidation is currently sweeping the netsourcing sector. It is now clear that:

- ▶ *Overcapitalisation in the industry has resulted in significant oversupply in most netsourcing areas;*
- ▶ *Unclear value propositions, entrenched customer biases, and the dot-com implosion and the "shakeout" previously referred to have resulted in slow market penetration;*
- ▶ *The predicted high growth for application service providers has failed to materialise. Over 1,500 ASPs struggle to survive as customer penetration rates remain insignificant.*

Heightened security fears may lead to increased use of Internet data centres, as companies focus on the need for effective disaster recovery plans⁶⁴. Companies that manage IT data centres, such as IBM and EDS, could also benefit, as many businesses may find it more attractive to outsource their IT departments. Web hosting companies are also likely to benefit as companies move to host critical parts of their IT infrastructure outside of their own facilities.

⁶⁴ FT, "NY Disaster Highlights Need for Data Storage and Back-Up", 18 September 2001.

Key International Developments – Electronic Payments

Norway, Singapore, and Canada are generally considered to be among the leading countries in the development and deployment of electronic payment infrastructure. Each of these countries is relatively small, but each has achieved a relatively high proportion of electronic payments.

Norway

In Norway between 1994 and 1996, overall payment value grew by over 19% annually, while the proportion of total national payments transacted by electronic giro and card increased from about 50% to nearly 80%. This was largely achieved through the BBS, the Norwegian Payment Organisation, which was set up as a commercial entity by the commercial and savings banks in Norway in co-operation with the central bank and the Government. BBS established relationships with other key industry players, such as the oil and utilities companies. Between 1992 and 2000, BBS spearheaded several infrastructure initiatives to streamline and digitise payments.

The ePayments infrastructure in Norway includes EDI-based inter-bank standards, consolidation of card acquiring infrastructure across banks and oil companies, and electronic collection solutions for business. These solutions include direct debit, giro payments using telephones and PCs, electronic bill presentation and payment (EBPP), automated reconciliation with corporate accounting systems, trust infrastructure for Internet payments, and image-based centralised processing of all paper-based transactions such as cheques. In 2000, BBS was awarded the Norway Quality Prize. It generated operating incomes of nearly €151m and employed nearly 700 people. The latest significant project undertaken by BBS is a Norwegian multi-purpose smart card project that will form the basis of future mobile payment applications.

Singapore

The Network for Electronic Transfers (Singapore) Pte Limited (NETS) was established by the banks in Singapore in co-operation with the Government and the Monetary Authority. Its aim is to develop a world-class infrastructure to strengthen Singapore's position as a leading financial services hub and its reputation as one of the most competitive economies in Asia.

Between 1996 and 2001, NETS has operated at the leading edge in the electronic payments space, implementing a number of ePayment initiatives designed to offer greater choice, flexibility and convenience to consumers and businesses. These initiatives include stored-value smart cards, virtual cards, financial EDI-based payment standards, secure Internet payment gateways, and electronic initiation of trade transactions. Its latest initiative is to leverage the chip-enabled point-of-pay infrastructure in Singapore and its "virtual" card capability in order to develop mobile payment propositions. Over the past ten years, NETS has successfully increased the proportion of electronic giro and card-based payments to more than 60% of overall payments.

Canada

Between 1995 and 2000, electronic payments as a proportion of overall clearing house transactions in Canada increased from 38% to 65% in volume terms, and from under 2% to more than 15% in value terms. Over the same period, the Canadian debit services volume grew to 2 billion transactions (nearly 11 times bigger than 1995), surpassing the banks and making it the preferred payment mechanism for consumers and merchants.

The increase in electronic payments in Canada has been driven by a broad collaborative approach between banks, Government, the post office and other stakeholders. It was formalised into two separate organisations: Interac and CPA. Interac operates ATMs and EFTS-POS (Electronic Funds Transfer System – Point of Sale), while CPA operates ACH-type payments and paper-based clearing.

The Canadian Government has provided ongoing legislative support for the development of a world-class ePayments infrastructure in Canada, which provides a balance between the collaborative needs of efficient infrastructure development and the need to foster competition. The CPA has also worked closely with the various Government agencies in Canada to ensure that a large majority of Government payments are processed electronically.

Key International Developments – B2B Exchanges

The growth in B2B exchanges and eMarketplaces was one of the most prominent trends in eBusiness in 2000. During 2001, it became clear that many of the independent pure-play exchanges were experiencing difficulties in acquiring customers.

Private exchanges – extranets designed to better integrate a company's supply chain relationships with suppliers and customers – now appear to be the most successful B2B exchanges. Private exchanges set up by major industry players have sufficient market power to compel or persuade customers and suppliers to participate.

Key Developments – Ireland

One of the key challenges identified in the baseline study was the need to attract the newer breed of Internet infrastructure and service providers to operate in the Irish marketplace. The baseline study also highlighted the lack of “low-cost, always-on” access for SMEs. In May 2000, international connectivity was a major issue for businesses operating in Ireland.

The Global Crossing Initiative, which went live in July 2000, effectively dealt with any issues regarding Ireland's international connectivity. It also led to an influx of Internet data centre operators into the Irish marketplace. In October 2001, Accenture estimated that Ireland had up to 850,000 square feet of data centre space available. However, domestic demand for such space was estimated at somewhere between 125,000 and 130,000 sq. feet.

The Internet data centre market sector in Ireland is now facing significant consolidation. Already, a number of planned projects have been cancelled, and two international operators with facilities in Ireland have filed for bankruptcy. Domestic operators are also consolidating.

Support Services – the Critical Challenges

The critical challenge now facing Ireland is the need to maintain a critical mass of Internet data centre operators in Ireland. These are needed to provide support services for eBusiness in Ireland and to encourage the development of managed services offerings. For the operators of Internet data centres, the critical challenges now are to survive the current wave of consolidation, to move up the value chain rapidly, and to develop managed services offerings. To assist the development of the Internet data centre sector in Ireland, the IDA should work closely with operators to jointly market Ireland as a location for managed services and disaster recovery.

It is crucial to the development of Ireland as an eBusiness hub that Ireland possesses a strong base of Internet data centre operators who are highly skilled in the provision of managed services. It is crucial, not only to the development of eBusiness in Ireland, but also to enable Ireland to take advantage of new opportunities in outsourcing and in the provision of shared services to multinationals.

Major issues for the development of eBusiness in Ireland include telecommunications, and in particular the deficit in regional broadband infrastructure and the lack of “low-cost, always-on” access. It is essential that the Government’s National Broadband Investment Initiative results in the effective, and co-ordinated, deployment of regional broadband infrastructures and services through the extension of open-access, diverse, resilient and advanced broadband and dark fibre backbone infrastructures and the development of competitive local access infrastructures for the provision of broadband services, including DSL.

The lack of a clear regulatory framework has hampered the development of the telecommunications sector in Ireland. The passage of the Communications Regulation Act 2002 is welcomed, as it will help establish a strong and effective, pro-consumer regulatory regime which is required to set a comprehensive, credible and transparent regulatory framework within which all telecoms service providers can fully develop the market opportunities in broadband services. In addition, the telecommunications sector both internationally and in Ireland, are suffering from capital rationing. It is clear that Ireland must position itself as an attractive location for telecommunications operators to build infrastructure here and to provide services.

From a national competitiveness perspective, it is critical that an implementation strategy for electronic payments be agreed and implemented to bring Ireland into line with the leading countries such as Norway, Singapore, and Canada.

Key Actions

The following actions are identified:

Action	Responsible
Increase the marketing drive to position Ireland as a centre for Data Centre Services, Managed Services, and Disaster Recovery	IDA
Work with existing outsourcers and new entrants to position Ireland as a centre for international outsourcing operations	IDA
Encourage the operators of Internet data centres to move up the value chain and provide Managed Services	IDA/Enterprise Ireland
Continue to ensure that there is an effective, and co-ordinated, deployment of regional broadband infrastructures and services	Department of Communications and Natural Resources
Consider the use of tax incentives to encourage investment in open access broadband infrastructure	Department of the Finance/ Department of Communications and Natural Resources
Agree and execute an implementation strategy for electronic payments	Government/Banks/An Post/Utilities

4.5

Financial Environment

Introduction

Key elements in the financial environment include the availability of venture capital (seed and start-up funding) and equity capital. Seed capital is required to develop an initial idea into a viable business plan that can then be put to venture capitalists for start-up and expansion funding.

Traditionally, Europe has lagged behind the US in this area. However, US venture capital funds have begun to take a greater interest in the European market, and are seeking to invest in areas where Europe has a lead over the US, such as wireless technology.

The stock market turbulence of April 2000 had a major impact on the financial environment for eBusiness. The first result was a major flow of venture capital away from Internet pure-plays, especiallyetailers, and towards the providers of eBusiness infrastructure, such as software and technology firms, and in particular wireless technologies, mCommerce and optical networks. With the continuing worldwide downturn in the ICT sector, venture capitalists are now shifting their attention to the biotechnology sector.

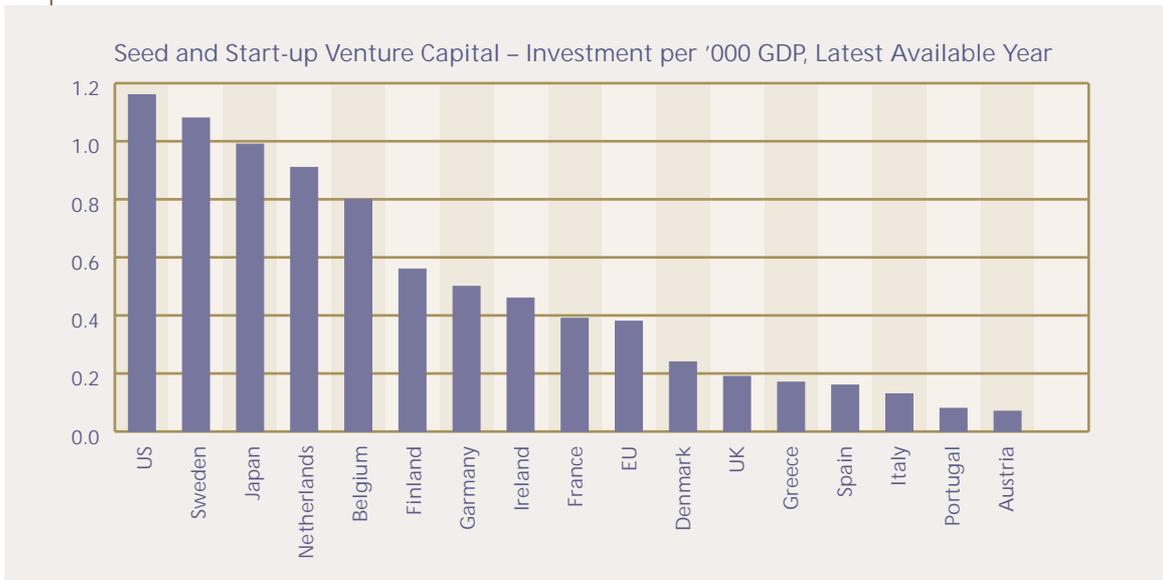
Emerging Best Practices

Characteristics of the financial environment in leading eBusiness nations include:

- ▶ *Ready availability of venture capital;*
- ▶ *Presence of international, specialist venture capital firms;*
- ▶ *Presence of a pool of angel investors;*
- ▶ *Ready access to capital markets.*

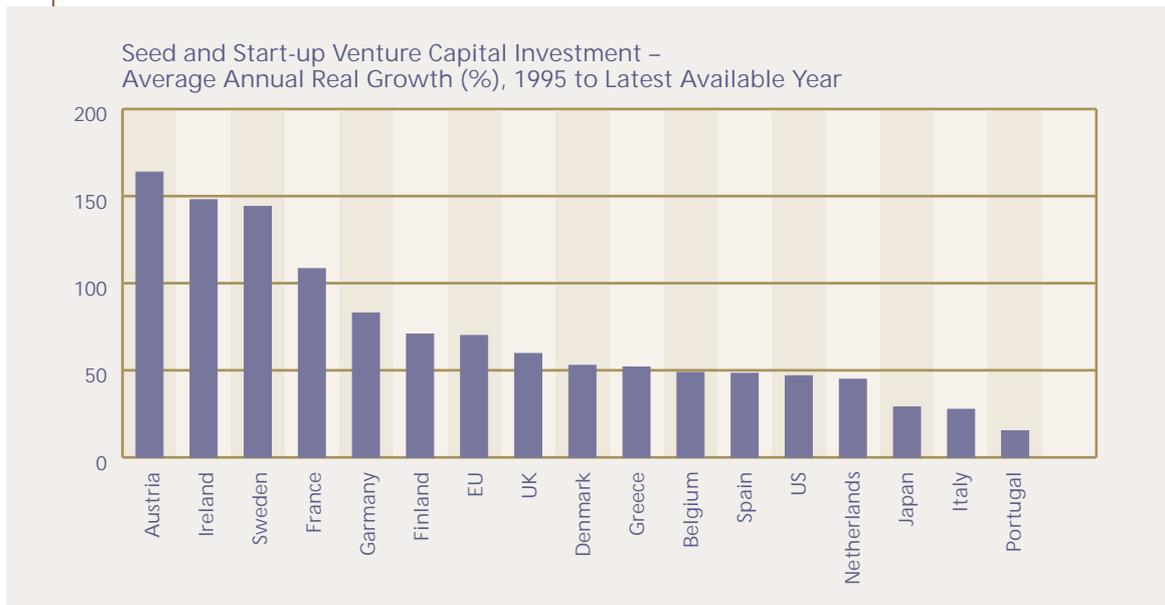
Figure 11 notes that Ireland compares relatively well with leading countries.

Figure 11 *Levels and Growth of Venture Capital in the OECD*



Source: European Commission, *Towards a European Research Area, Key Figures 2001*.

Figure 11 *Levels and Growth of Venture Capital in the OECD*



Source: European Commission, *Towards a European Research Area, Key Figures 2001*.

Key Developments – the US

The US, as the world's most developed digital economy, was the most affected by the stock market upheaval. According to the *Industry Standard*⁶⁵, €3.7 trillion was wiped off the value of the NASDAQ between March 2000 (when it peaked) and May 2001. In the second quarter of 2001, according to the PricewaterhouseCoopers MoneyTree, equity investments into venture-backed companies amounted to just €9.1bn, compared with €11.6bn in the first quarter. This represents a decline of 21% – significantly less than the 41% decline in the previous quarter. In the second quarter, 669 companies received funding, down from 752 in the first quarter.

Key Developments – Europe

The movement of large amounts of venture capital into Europe is a relatively recent phenomenon. The vast majority of IPOs are in the UK and Germany, followed by the Nordic region. It seemed at first that Europe would be less affected than the US by the stock market turbulence, as European companies are only beginning to emulate the development of their US counterparts. However, the European technology sector was seriously hit by capital rationing in the Telecommunications sector due to the inflated prices paid by telecommunications companies for 3G licenses. The slowdown in Europe is in large part being driven by the proportionally greater exposure of European technology firms to the telecommunications sector.

⁶⁵ *The Industry Standard*, May 2001, <http://www.pwcmoneytree.com>, FT Survey, *Private Equity*, 6 November 2001.

In 2000, 31% of the total European venture capital (€11bn) was invested in high-tech firms. Most analysts believe that the share of high-tech firms will fall in 2001 by at least 25%. However, overall levels of venture capital available have not fallen dramatically.

Within the high-tech sector, venture capital lending has remained steady for wireless companies and for software companies that focus on developing customer relationship management applications.

Key Developments – the Nordic Region

The Nordic region has emerged as an important zone within Europe for venture capital. Its success has been driven mainly by the clustering effect of high-tech (especially wireless) companies. Weakness in the telecoms market, however, is having a significant negative impact on the Nordic venture capital market. High levels of investment in 3G licences and delays in the roll-out of 3G are already having a negative impact on wireless services companies, one of the mainstays of the Nordic start-up sector. According to an article in the *Financial Times*⁶⁶, some observers believe that the number of venture capital firms in Sweden could shrink from 230 to 46 in the current slowdown.

Key Developments – Israel

Though Israel has a population of only 6m, venture capital investments in the country surpassed €1.16bn in 1999, a feat matched in Europe only by the UK and Germany. Israel has 100 companies listed on NASDAQ, third only behind the US and Canada, and has the highest density of engineers of any country in the world. It produces an average of 4,000 start-ups each year.

However, Israel has also been hit by the technology downturn. According to IVC, an Israeli research firm, venture capital investments in Israeli technology companies dropped from €2bn during the second half of 2000 to €1.3bn during the first half of 2001. A large number of high-profile start-ups have already failed.

The Israeli military is critical to Israel's development in this area: military service is compulsory, and people with strong mathematical and science skills are sought after. The result is that every year, engineers with high-end technical and strong project management skills enter the private sector.

Indigenous Israeli venture capital firms tend to focus on providing seed capital, and rely on the US to supply second- and third-stage investment. European and US venture capital firms also bring valuable expertise and contacts to the start-ups. Israeli venture capital firms tend to focus on firms with good underlying technologies, and then guide the entrepreneurs to develop business models to suit global trends. The focus has been on infrastructure technologies, particularly related to security and telecommunications.

⁶⁶ *Financial Times*, "European Private Equity" June 14, 2001.

Key Developments – Ireland

In 1999, €182m was invested in 128 companies. Investment in early-stage companies, including start-ups, amounted to approximately €30m. Venture capital investment in high-tech firms had increased five-fold between 1997 and 1999, from approximately €12m to approximately €66m. In 1999, within the high technology sector, the category that received the most funds (€22m) was Internet-related communications companies.

The amount of venture capital raised in Ireland increased from €21m in 1997 to €254m in 1999. The main sources of funds were pension funds and banks. 57.7% of the funds came from Ireland, with a further 33.7% from the European Union. (These figures do not include capital invested by venture capital firms with no base in Ireland. Anecdotal evidence suggests that this may be a substantial amount.)

In 2000, according to the *Irish Venture Capital Association's Annual Report*, Irish venture capitalists invested a record €208.2m, with Irish technology firms accounting for 75% of that investment. Irish venture capitalists raised €231m for investment in 2000 – down from €254m in 1999. The Irish venture capital market in 2001 appears able to fund larger projects. For the first time, it funded five deals in the €6.3m to €12.7m range (£5m-£10m). However, the majority of deals (75%) were for less than €1.3m.

Irish firms seeking a flotation on the stock market are no longer confined to the NASDAQ. They can choose from specialist exchanges in Europe, such as AIM in London, EASDAQ in Brussels, and Neuermarkt in Germany. The launch of the ITEQ, the technology market of the Irish Stock Exchange, will also assist high-tech start-ups to obtain a stock market quotation. It will also make it easier for Irish venture capitalists to realise their investments. However, volatility in the stock market valuations of technology companies, combined with recession in the US economy, is affecting companies planning an IPO. Typically the “burn” rate for companies increases in the period prior to an IPO as they seek to build up the company's valuation for flotation.

The recent tightening of the venture capital market has made it more difficult for companies to access seed finance, and particularly, second and third round finance. This difficulty is exacerbated in the regions outside Dublin, which do not have the scale or the vibrancy of the Dublin venture capital market. In January 2002, Enterprise Ireland announced a major injection of liquidity into the venture capital market. Enterprise Ireland is investing €95m in twelve new venture capital funds to be managed by private sector partners which should leverage an estimated €400m for investment in start-up and early stage businesses. A particular feature of the new funds is that 56% of the money available will have a regional or sectoral focus delivered through eight of the funds.

Critical Challenges

The Irish venture capital market has developed very significantly over a short period of time. In terms of their ability to raise capital, Irish entrepreneurs with good ideas/products and a strong management team do not appear to be at a competitive disadvantage compared with their European or Israeli colleagues. However, venture capitalists are not only sources of funding – they also provide advice and industry contacts to their clients. For this reason, it would be desirable to attract more specialist venture capitalists to the Irish market.

Key Actions

The following action is identified:

Action	Responsible
Encourage US venture capitalists, especially specialist venture capitalists, to locate in Ireland. This would provide access to funding, expertise and international contacts.	IDA/Enterprise Ireland

4.6

ICT Adoption

Introduction

The use of information and communication technologies (ICT) continues to grow worldwide. PC use in both business and in the home, and Internet penetration are some of the factors taken into account when considering the level of ICT adoption.

Emerging Best Practices

Emerging best practices in ICT adoption include:

- ▶ *High level of Internet penetration among business (in particular SMEs) and consumers;*
- ▶ *Growing use of eBusiness;*
- ▶ *High level of Internet hosts;*
- ▶ *High level of PC penetration;*
- ▶ *High level of mobile phone penetration;*
- ▶ *High level of interactive digital TV penetration;*
- ▶ *Programmes in place to address the Digital Divide.*

Key Developments – The US

In the US, the Small Business Administration Board (SBA) uses a range of initiatives to encourage small firms to adopt eBusiness. It is developing a web-based eBusiness course and, with the "National Partnership for Reinventing Government", is creating a gateway to facilitate business access to Government information and services. The SBA has also developed PRO-Net, an electronic gateway providing procurement information for and about small businesses. The Department of Commerce organises virtual trade shows called "eExpos USA" where more than 600 companies regularly exhibit their products.

Key Developments – The UK

In the UK, the Department of Trade and Industry has published an International Benchmarking Report 2001, which compares British practice with that of a number of other countries. The principal findings are:

- ▶ *94% of all UK businesses are connected to the Internet;*
- ▶ *While applications such as online messaging and online marketing are relatively widespread, online activities that require an increasing level of interaction and technical level of complexity have lower levels of adoption;*
- ▶ *Among the benchmarked countries, businesses tend to be further along the eBusiness adoption ladder when dealing with their suppliers rather than customers.*

In addition, the Office of National Statistics published the first eBusiness survey of UK businesses in May 2001. A second ONS Survey, published in October 2001, found that Internet sales were estimated as being worth nearly €60bn, which represent 2% of total sales. The financial sector was a big user of e-commerce; when the financial sector is excluded e-commerce was used for just 0.9% of sales. The insurance, air travel, and computing and office machinery manufacturing sectors carried out relatively high levels of Internet sales – around 30-40% of sales are via electronic networks. The survey also found that the average length of time that businesses had used e-commerce for sales was only a few months and still less than a year for the largest companies.

Key Developments – Sweden

Sweden has the most advanced rate of ICT adoption of the Nordic nations. A key element of this lead is the 1998 decision to give tax breaks for home PCs. 57% of Swedes are regular Internet users and 91% of all business are linked to the Internet.

Ireland

Research published by the Chambers of Commerce of Ireland⁶⁷ in 2000 showed that:

- ▶ *87% of SMEs had at least one computer;*
- ▶ *Nearly 7 in 10 SMEs had Internet access, though this varied widely between sectors, 85% of manufacturing companies had Internet access while only 46% of retail companies had access;*
- ▶ *Of the 69% of firms connected to the Internet only 21% used ISDN connections;*
- ▶ *34% of SMEs have their own web site.*

This last year has seen a continued increase in Internet adoption in Ireland. The most recent research on the adoption of ICT and eBusiness by SMEs was published in September 2001. The Chambers of Commerce of Ireland conducted the research in May 2001 with support from the Department of Enterprise, Trade and Employment. Its key findings included:

- ▶ *90% of Irish SMEs have at least one computer;*
- ▶ *81% of Irish SMEs had Internet access;*
- ▶ *38% of Irish SMEs are now using an ISDN connection;*
- ▶ *46% of the companies surveyed had a web site, a 12% increase on 2000⁶⁸.*

There may be a need for specific policies to drive the adoption of ICTs by SMEs. Research suggests that many SMEs are failing to fully exploit the opportunities these offer. For example, Irish businesses tend to rely on a search engine to attract visitors and only a minority use Internet marketing tools such as direct email, email newsletters or affiliate programmes. There is a clear need to educate companies in techniques to attract and retain visitors so that they can be turned them into customers.

As can be seen in Figure 12, Ireland continues to make progress in the consumer adoption of the Internet.

⁶⁷ Chambers of Commerce SME eBusiness Survey 2000.

⁶⁸ Chambers of Commerce SME eBusiness Survey 2001.

Figure 12 *Internet Access in EU Households (October 2000 - December 2001)*



Source: Eurobarometer.

The Chambers of Commerce iCommerce initiative, which aims to create an online marketplace for Irish SMEs will assist moves by Irish firms to deal with customers and/or suppliers electronically. The first phase, which went live in May 2001, allowed firms to put catalogues online so that companies could purchase online. Additional value added features will be added incrementally. The adoption of eBusiness by SMEs will also be helped by the implementation of eProcurement by the Government.

Although interactive digital TV (IDTV) is fast becoming an important access technology for consumers, there has not yet been a large scale roll-out of IDTV services in the Irish marketplace. Since Ireland is falling behind the UK in deployment of IDTV, it is crucial that Terrestrial Digital TV be rolled out as swiftly as possible and that the licensing regime is developed to encourage full use of interactive services.

In 2000, a number of eBusiness Awareness to Action campaigns were run, aimed at increasing the awareness of ICTs and the knowledge economy among businesses, especially SMEs. A series of regional master classes was run, to assist companies in applying the appropriate technologies to enhance their business capabilities. In addition, Enterprise Ireland is administering a €12.7m eBusiness accelerator programme, which is designed to showcase the positive benefits of eBusiness across a range of firms. Over 100 projects have been approved for funding.

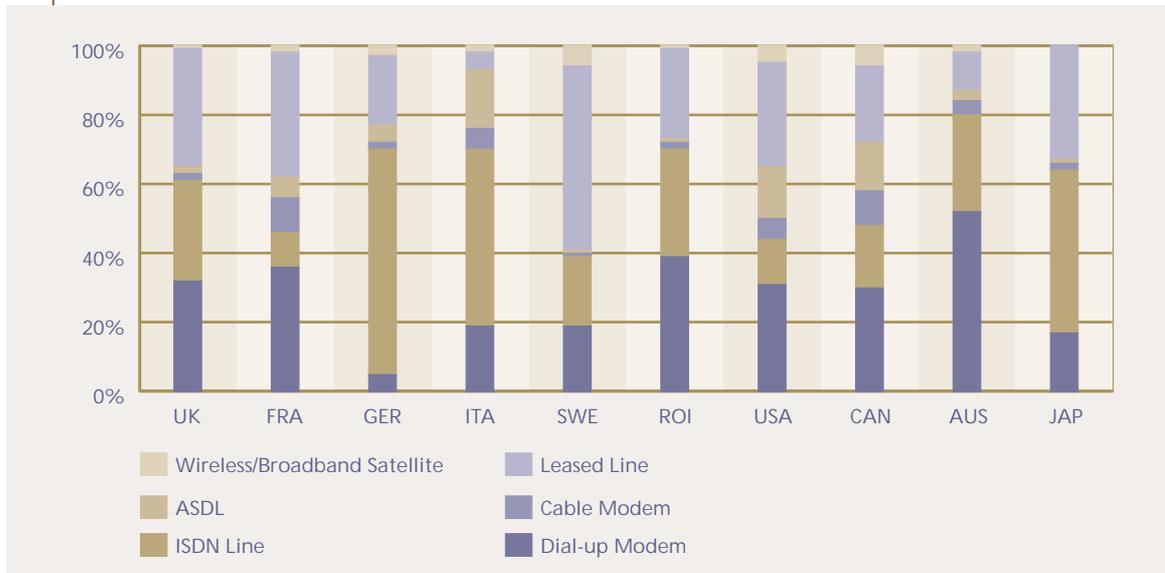
The County Enterprise Boards' Empower Initiative provides similar support for small businesses.

ICT Adoption – Critical Challenges

Ireland continues to lag behind the leading countries in terms of Internet and PC penetration. Of more pressing concern is the adoption of ICTs by the SME sector. Available statistical evidence would suggest that Ireland compares favourably in terms of SME usage to ICTs and eBusiness. However, without “low cost always-on access” telecommunications, it is likely that the adoption of sophisticated eBusiness applications by SMEs will be limited. It is critical that regional roll-out of broadband be accelerated. According to the DTI *International Benchmarking Report 2001*,⁶⁹ 39% of companies in Ireland are connected via a standard telephone line to the Internet, with only 31% using ISDN, thus limiting the use of the Internet as a critical business process relative to companies in other countries.

⁶⁹ UK Department of Trade and Industry, *International Benchmarking Report 2001, Business in the Information Age*.

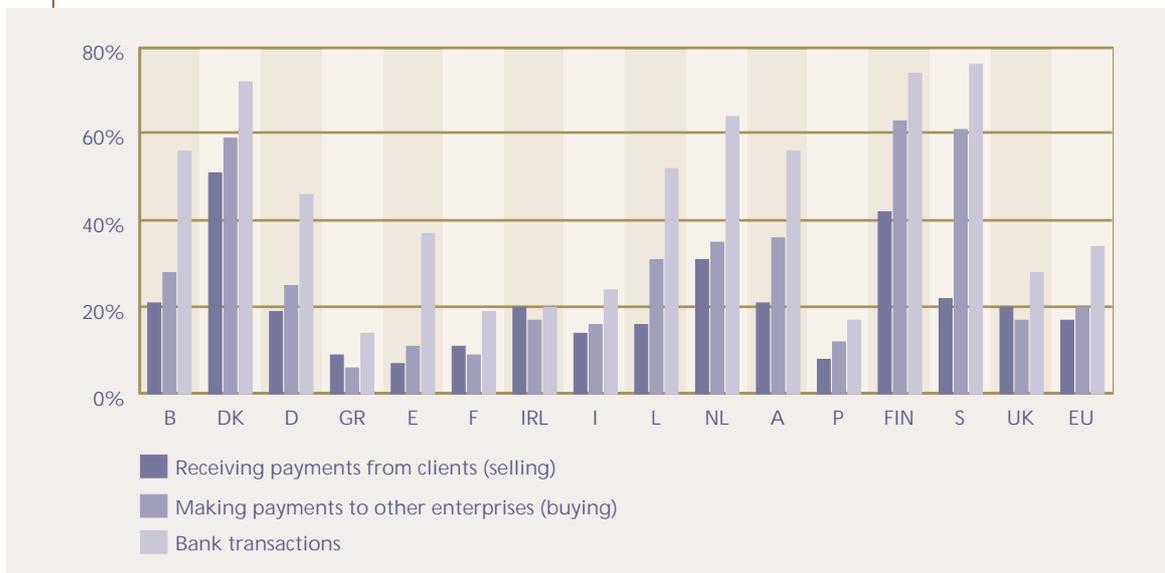
Figure 13 *Type of Telecommunications Connection to the Internet*



Source: DTI International Benchmarking Report 2001.

As in most other countries, Irish SMEs tend to lag behind larger companies in Internet penetration, in investment in information and communications technology, and in the use of the Internet for business. Even among SMEs who do use the Internet, there is an underlying lack of sophistication and understanding of the potential of eBusiness (see Figure 14). Irish SMEs need to move beyond seeing the Internet as an information and marketing tool to seeing its value as an online ordering and purchasing tool.

Figure 14 *SME Use of Internet for Payments, 2001, in Percent of SMEs Connected to Internet*



Source: ENSR Survey 1999 and 2001, Observatory of European SMEs.

To counter scepticism about eBusiness amongst SMEs, it is essential that programmes designed to encourage the adoption of eBusiness address the real needs of small business such as cost and competitiveness issues. As eBusiness becomes an integral part of the way companies do business rather than something that is outside of their core activities, this change is mirrored by the services offered to business by the development agencies.

Key Actions

The following actions are identified:

Action	Responsible
Reposition programmes to educate SMEs about eBusiness to focus on achieving competitive advantage through eBusiness adoption.	Enterprise Ireland
Integrate eBusiness into all of the services offered by agencies.	Enterprise Ireland/IDA
Encourage the roll-out of broadband to the regions.	Government

4.7

Research and Development

Introduction

The US Government *Digital Economy* report notes that there is a relationship between the level of investment in R&D in a country and the level of eBusiness activity⁷⁰. The European Commission recently completed a major review of R&D in the countries of the EU, the US and Japan – *Key Figures 2001: Towards a European Research Area*. Key findings of the report show the share of R&D expenditure, expressed as a proportion of GDP, is greater in the US and Japan than in the EU, as can be seen in Figure 15. However, within the EU, Sweden and Finland have a higher intensity of spending than other EU member states and the US and Japan. Total R&D expenditure has grown very rapidly in Ireland resulting in a more modest increase in its R&D intensity.

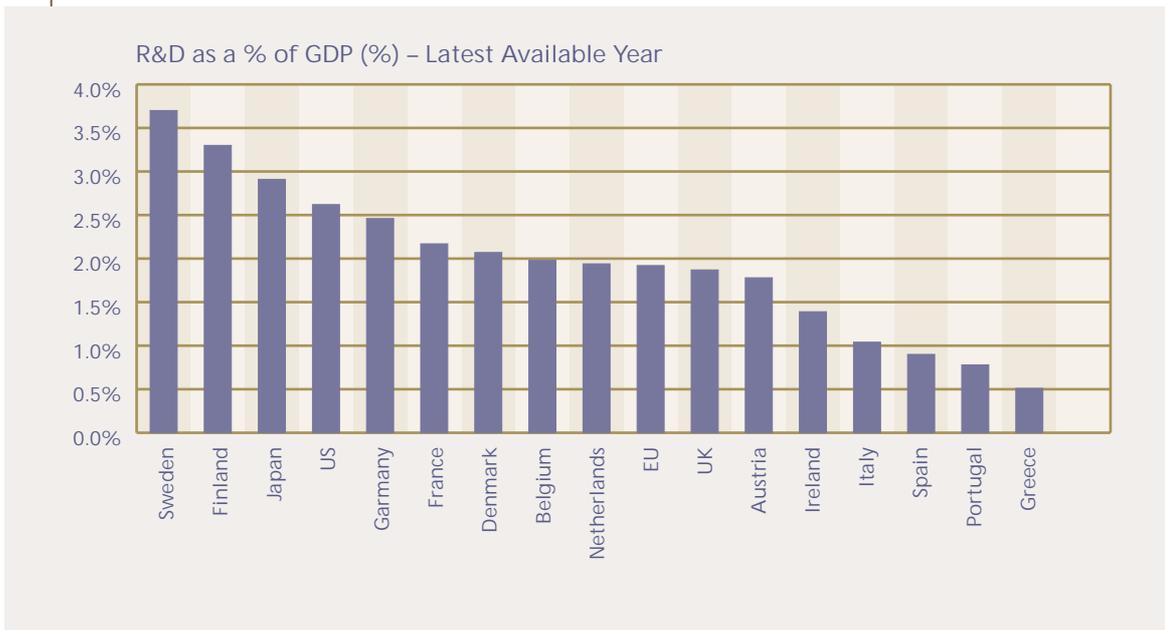
Emerging Best Practices

Emerging best practices in the field of ICT R&D include:

- ▶ *High level of GDP spent on R&D;*
- ▶ *Strong commitment by Government to R&D;*
- ▶ *A base of major companies in the high-tech sector;*
- ▶ *Close collaboration between state and private sector in industrial research;*
- ▶ *International collaboration in R&D;*
- ▶ *High investment in postgraduate education and young researchers;*
- ▶ *Targeted research in priority areas.*

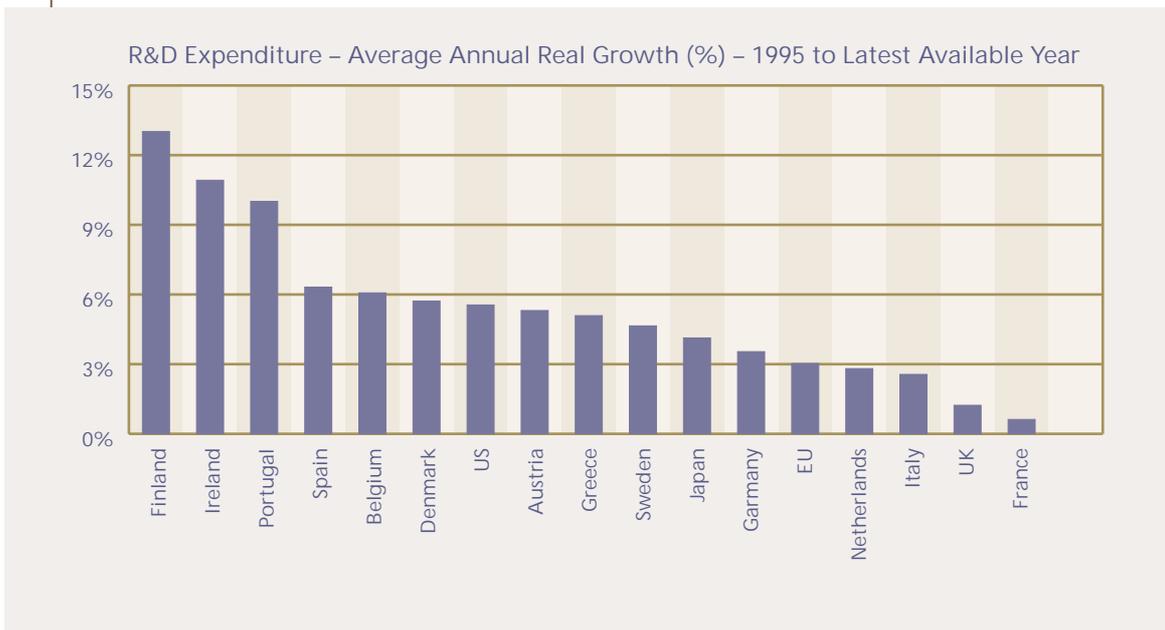
⁷⁰ *Digital Economy 2000 (June 2000).*

Figure 15A Levels of R&D Expenditure



Source: European Commission Key Figures: Toward a European Research Area.

Figure 15B Growth in R&D Expenditure



Source: European Commission Key Figures: Toward a European Research Area.

Key Developments – The US

According to the report, *Digital Economy 2000* (June 2000), the surge in IT investment in the US has been accompanied by a sharp increase in R&D by the IT industry. In 1998, the IT sector invested nearly 50% more in R&D than traditional investors such as the automotive, pharmaceutical and aerospace sectors. Software firms and components manufacturers have driven this increased investment.

Key Developments – The UK

In the United Kingdom, the Department of Trade and Industry (DTI) has undertaken a number of initiatives to foster ICT research to promote the growth of the information age economy.

These include:

- ▶ *SMART – a DTI scheme which provides grants to SMEs for feasibility studies and the development of innovative technology;*
- ▶ *LINK – the LINK scheme is the Government's principal mechanism for promoting partnership in pre-competitive research between industry and the research base. The scheme offers an opportunity to tackle new scientific and technological challenges so that industry can go on to develop innovative and commercially successful products, processes and services;*
- ▶ *UKISHELP – gives information about the programmes and provides a help line so that people can get involved and obtain European Union funding for information society projects in research, development, applications and content.*

The Nordic Region

Among the EU, Sweden and Finland continue to be the most impressive performers in R&D. In many of the key indicators, Sweden outperforms not only the rest of the EU but also the US and Japan.

Sweden has reorganised the structures it uses to support R&D. Since January 2001, a new organisation has existed for research funding. In addition, three new research councils have been formed, while a large number of research funding bodies have been discontinued. The new organisation is seeking to promote concerted action in key scientific areas, to strengthen researcher control, to promote collaboration between different research fields and to improve the spread of information about research and its findings.

In addition, the Swedish Government has set up an agency for innovation systems, which funds R&D to support innovation systems for sustainable development and growth. Activities include support R&D in technology development, biotechnology and ICT.

Sweden also has the advantage of having a base of large companies who conduct a substantial amount of R&D. The ten largest companies in Sweden account for half of the R&D in the business sector. The public and private sectors co-operate in "industrial research institutes", which they fund jointly.

This emphasis on R&D has already led to practical economic benefits. Finland and Sweden have emerged as centres of wireless R&D leading to an influx of foreign venture capital funding and foreign direct investment from firms such as Microsoft and Intel.

The Norwegian Government has prioritised ICT research as one of its four key areas. In addition, it has put in place a policy where grants for R&D work require the recipient to take into account the greatest possible level of universal design.

Ireland

As a result of the Technology Foresight exercise, the Irish Government announced a major funding programme to aid R&D in Ireland. The Technology Foresight fund will be used to establish Ireland as a location for world-class research excellence in niche areas within ICTs and biotechnology. The new fund will be used to develop Ireland as a dynamic location for innovation, particularly in ICT and biotechnology.

Science Foundation Ireland, a new national foundation dedicated to world-class excellence in research was launched in July 2000. Science Foundation Ireland is responsible for the management, allocation, disbursement, and evaluation of expenditure of the Technology Foresight Fund of over €635m for investment in world-class basic research in the years 2000-2006. Researchers from home and abroad have been invited to compete for funding. In its first call for proposals, SFI announced funding of €71 million to ten principal investigators who are heading up teams, each consisting of 10 to 12 researchers carrying out leading edge international research in Ireland. These teams will conduct research in ICTs and biotechnology for a period of 5 years.

The development agencies are promoting Ireland's base in R&D through developments such as:

- ▶ *Nova, a €12.7 innovation centre to nurture and develop high-tech enterprises is being developed in UCD. The centre will offer a range of facilities and programmes to stimulate entrepreneurship, technology transfer, and innovation. Supported by Enterprise Ireland, the partnership companies are AIB Bank, Arthur Cox, Deloitte and Touche, Ericsson, Goodbody Stockbrokers and Xilinx.*
- ▶ *Nokia announced a €1m investment for mobile research in the University of Limerick, supported by IDA Ireland. Currently, foreign sources fund only 3% of research in third-level institutions in Ireland (approximately €4.57m), far behind other EU states.*
- ▶ *In June 2001, Enterprise Ireland launched an R&D awareness initiative in order to raise awareness of the role of science, technology, and innovation in Irish industry, and to provide advice on the range of programmes available.*

The European Union's *Framework Programme of Research, Technological Development, and Innovation 1998-2002*, is also being used to establish Ireland as a location for world-class research excellence in niche areas within the ICT and eBusiness areas.

In addition to this, Media Lab Europe was opened in July 2001. Media Lab Europe's overall goal is to enhance quality of life through research and education. Its focus is on sustainable, human-centred design in technology, science and the arts. It is expected to foster greater levels of innovation and entrepreneurship in Ireland, through the development of a parallel incubator/accelerator unit.

Research and Development Critical Challenges

Research and development is one of the environmental factors where the Government has made real and significant progress in a very short period of time. Total R&D expenditure has grown very rapidly in Ireland resulting in a more modest increase in its R&D intensity. Perhaps the critical challenge facing the development of R&D in Ireland is the lack of major companies (outside of the food sector) of sufficient scale to fund major R&D programmes. It is therefore critical that the IDA with SFI continue to market Ireland as an R&D centre to the multinational sector. This will increase the private sector's contribution to Ireland's research efforts.

Key Actions

The following actions are identified:

Action	Responsible
Continue to market Ireland as a centre of R&D among the existing client base and potential new clients.	Science Foundation Ireland/IDA
Encourage international researchers to work in Ireland.	Science Foundation Ireland/ IDA/Enterprise Ireland

4.8

Skills

Introduction

According to Bruno Lamborghini, chairman of the European Information Technology Observatory (EITO), the shortage of ICT and eBusiness skills remains the greatest barrier to the achievement of eEurope⁷¹. According to the EITO, Western European demand for ICT skills in 2000 was for 10.4m people, leading to an estimated shortfall of 1.2m people. The EITO forecast that the skill shortage will grow further. In 2003, the EITO estimates that demand will have risen to 13m people while supply will have only risen to 11.3m, thus creating a shortage of 1.7m people. For eBusiness skills, the EITO estimate that demand stood at 4.1m people in 2000 but supply was 3.4m. And by 2003, demand for people with eBusiness skills will have risen to 8.9m people while the supply will have risen to 6.7m.⁷²

Many countries are struggling to address this skills issue. In Germany, the Parliament passed regulations to offer 20,000 green cards to IT professionals allowing them to work in Germany for up to five years. In Korea, the Government is offering foreign IT professionals gold cards that will allow them to live in the country for up to 10 years without renewing their work visas.

The impact of the downturn in the technology sector allied to worldwide economy uncertainty will undoubtedly lead to a reduction in the demand for skilled staff. The *Financial Times* estimates that major international technology firms have laid off in excess of 244,000 people between 1 July and 1 October 2001. This does not take into account the number of start-ups, which have let people go or gone into liquidation. Whether this will lead to the elimination of the skills shortage remains to be seen. Certainly, there is already anecdotal evidence in Ireland that demand for people with technical skills has reduced significantly in a very short period. Most of the major multinationals have imposed hiring freezes, while many firms, both multinational and Irish, have introduced lay-offs.

Emerging Best Practice

Emerging best practices in dealing with the skills shortage include:

- ▶ *Integration of ICT and eBusiness into the education system;*
- ▶ *Focused training readily available to SMEs;*
- ▶ *Major retraining programmes in place;*
- ▶ *Open door policy for skilled immigrants/researchers.*

⁷¹ European Information Technology Observatory 2000.

⁷² European Information Technology Observatory 2001.

The US

In the US, the H-1B visa programme admits skilled foreign labour; in 1998 Congress raised the number of H-1B visas from 65,000 to 115,000. With ever-increasing demand, several bills have been introduced in Congress to either raise the limit to 200,000 or to remove the cap temporarily.

Other US initiatives include:

- ▶ *Department of Labor grants to train workers for IT and health-care jobs that are often filled by immigrants. These will use funds from the €561 visa application fee. The Department will also fund projects to train workers in local markets;*
- ▶ *Department of Education and Science grants to train 400,000 teachers to use information technologies in the classroom;*
- ▶ *The Department of Commerce's Technology Administration GO4IT web site provides access to a wide variety of workforce initiatives around the country.*

Recent stock market volatility has resulted in considerable job losses in dot-coms and technology companies. However, demand still exists for programmers and engineers with experience, whereas business development executives, marketing staff, and administrators are having a much harder time securing new employment. The US Department of Labor estimates that by 2006, 5.6m people will be needed to fill IT positions.

The UK

In the UK, the Institute of Employment has estimated that the IT services industry alone will need to recruit 540,000 people between 1998 and 2009. A package of initiatives has been created to address this skills shortage – this package includes the following:

- ▶ *A strategic group to oversee the implementation of a skills strategy outlined in the 1999 report Skills for the Information Age;*
- ▶ *A visa scheme (non-quota) to attract non-EU ICT workers;*
- ▶ *An increase of €1.65bn in investment for buildings, laboratories and equipment for scientific research;*
- ▶ *Increase in stipends for Science and Engineering students;*
- ▶ *Investment of €13m to drive forward the ICT skills strategy;*
- ▶ *An Internet mentoring initiative to help Internet start-ups and established SMEs to make the Internet the focus of their business.*

A major emphasis in the UK has been the use of IT in education. The British Government is making a €1bn investment in ICTs in schools between 2001 and 2004, €660m of which is for new technology in schools. It is also making €8.2m available for a new eLearning foundation, which will provide children from low-income families with portable computers and Internet access to learning materials.

Singapore

The Singaporean Government expects 114,000 people to be employed in the IT sector in 2001, with the demand for staff being strongest in eBusiness development and Internet development. To meet the skills challenge, the Singaporean Government is bringing in 1,000 qualified ICT workers from multinational operations and global training centres in countries such as China, India, Indonesia and Malaysia. The Government is also seeking to attract ICT academics and postgraduate students to work and study in Singapore.

Among the Singaporean initiatives are:

- ▶ *A skills redevelopment programme under which companies can sponsor their workers for training, which is co-financed by the Government;*
- ▶ *A development programme aimed at schools and institutes of higher learning that encourages both specialist (info-comm and applications development) and multidisciplinary training skills in emerging areas such as eBusiness, interactive media and knowledge management.*

Ireland

In 2000, a survey by the Information Society Commission stated that almost 80% of Irish companies saw skills shortages as an important issue. Many companies saw the need for more training as the key business barrier to the adoption of eBusiness, ahead of cost, security and telecommunications infrastructure. However, while 66% of companies said that IT training was essential or very important to their business, just 15% had provided it for all employees at the time of the survey, and almost half of Irish companies had no IT training plan⁷³.

It is reasonable to assume that mobile international investment will be a key determinant of which world regions will become the leaders in eBusiness. In the knowledge economy, investment capital will flow to where the highest concentrations of advanced skills and learning are located.

To address the skills issue, the Irish Government has made significant investments in third-level colleges. In 1997, the Government established the *Expert Group on Future Skills Needs* to tackle the issue of skill needs, education, and training for business and the IT sector. In response to the recommendations of the Expert Group's *First Report*, an additional €95m was made available for the provision of 5,400 third-level places, mainly in the engineering, computers and software areas, and €7.6m was provided for 1,500 students on IT postgraduate conversion programmes. This investment will significantly increase the projected annual supply of IT degree professionals and IT technicians. In May 2002, the Government announced the allocation of an initial €15m to further promote third-level provision for IT skills. This is the first part of a total investment of €165m recommended by the Expert Group on Future Skills Needs.

The Scientific and Technological Education (Investment) fund is providing €500m for the development of technology education at all levels. Specifically the fund is supporting the Schools IT 2000 Programme.

In 2000, the Expert Group published a report on eBusiness Skills which highlighted the need for skills encompassing management, creative as well as IT technical skills and IT literacy. The National Council for Vocational Awards has also approved an eBusiness Skills Course. The most recent report of the Expert Group on Skills Needs⁷⁴ believed that the impact of the economic slowdown in the US would not have a major impact on the demand for IT professionals in the medium to long term. The Expert Group estimated that there would be an annual shortfall of about 2,500 professionals and 800 technicians over the next five years.

Skills – Critical Challenges

The impact of the dot-com implosion in April 2000 took approximately six months to have an impact on the Irish marketplace. The closure of technology consultancy ebeon was the first real indicator that Ireland would not escape the downturn in the US technology sector, and its closure was followed by a spate of technology closures such as Gateway, Nua, and Formus Communications. As well as closures there have been redundancies and a general hiring freeze within the sector.

⁷³ *How the Business Community is adapting to the Information Society in Ireland, Information Society Commission 2000.*

⁷⁴ *The Third Report of the Expert Group on Future Skills Needs, July 2001.*

As yet, it is difficult to assess the full impact of the economic slowdown on the demand for eBusiness skills in Ireland. However, it would appear that the global economic downturn will slow the flow of foreign direct investment from the US to Europe. In the short term, the reduction in US foreign direct investment will have an impact on the demand for skilled ICT professionals. However, given the long lead-in between investment in education and the increase in the supply of skilled staff, it remains critical to make the investments in education recommended by the Expert Group on Future Skills Needs.

Key Actions

The following actions are identified:

Action	Responsible
Actively pursue the implementation of the actions and recommendations for the development of eBusiness skills contained in the Expert Group on Future Skills Needs' <i>Report on eBusiness Skills and the Third Report of the Expert Group in Skills Needs.</i>	Government
Proactively market Ireland as a location for foreign IT and software professionals (both EU and non-EU) who wish to build skills and develop their careers.	FÁS
Develop linkages with third-level colleges worldwide to source talent.	Department of Education and Science
Jointly develop eBusiness skills partnerships mechanisms to facilitate interaction between third-level institutions and business/industry and other interested stakeholders, e.g., trade unions.	Department of Education and Science
Implement the NCVA eBusiness course.	Department of Education and Science

5 Sectoral Developments in Ireland

Sectors Examined

Eleven industry sectors of particular importance to the Irish economy were analysed in some detail. Each sector was examined internationally, to identify best practice, and the current situation in Ireland was then compared with this best practice. Any gaps between the Irish sectors and the industry sector leaders were then identified, together with the issues and challenges for each sector.

The sectors analysed were

- ▶ *Software*
- ▶ *Electronics Hardware*
- ▶ *Dot-coms*
- ▶ *Non-food Retail*
- ▶ *Financial Services*
- ▶ *Tourism*
- ▶ *Education*
- ▶ *Logistics and Fulfilment*
- ▶ *Food and Agribusiness (including Food Retail)*
- ▶ *Digital Content and Intellectual Property Management*
- ▶ *Chemicals and Pharmaceuticals (including Biotechnology).*

Sectoral Variation

There are significant variations between the various sectors in the adoption of eBusiness. However, since the study began all sectors have made progress in the adoption of eBusiness. A number of Irish sectors are at or near the leading edge of eBusiness developments. With the exception of Chemicals and Pharmaceuticals, sectors that are dominated by multinationals are leaders in adoption of eBusiness. However, the Irish software industry is only marginally behind world leaders in the use of eBusiness, and is followed closely by the Electronics Hardware sector. Sectors such as Food and Agribusiness, and Logistics and Fulfilment, which are dominated by either indigenous companies or SMEs, are not as advanced.

Software – The Irish Software sector, both multinational and indigenous, compares well with its international counterparts. The software sector is moving to digital distribution. However, in Ireland, end-customers have been slower to use Application Service Providers (ASPs) than many analysts had predicted. The major focus of R&D has been in applications for mobile devices; however, the slowdown in the telecommunications sector may well cause this to change.

Electronics Hardware – The Electronics Hardware sector in Ireland compares well with its international counterparts, with leading companies such as Dell and Intel based in Ireland. Multinational firms in this sector have encouraged their sub-suppliers to adopt eBusiness to enhance their supply chain effectiveness.

*Dot-coms*⁷⁵ – While there was a great deal of hype in Ireland (and internationally) about the dot-com phenomenon, there were in fact very few Irish dot-coms. It is now clear that apart from a few niche sectors such as media and communications, travel services, books and gift retailing that pure-play

⁷⁵ *Dot-com, Internet pure-play or "born on the web" companies are companies such as Amazon.com which were created on the Internet and did not have a previous physical presence.*

Internet companies are unable to compete effectively with competitors who have both an online and an offline presence, and that this sector does not offer major opportunities for Ireland.

Non-food Retail – the Non-food Retail sector faces a number of challenges. The Irish market is comparatively small and is already well served by Retail outlets. Retailing over the Internet to the European market is complex given the fragmented nature of the market – multiple languages, varying levels of Internet penetration and different legal systems. There are opportunities for Irish retailers but these opportunities are limited to specific niches such as gifts – for example, Irish crystal and collectibles. Blarney Stone Enterprises, the manufacturer of collectibles is a good example of a firm successfully using the Internet to sell its products to the US market.

Financial Services – A report by Prospectus Strategy Consultants⁷⁶ found that Ireland's financial services players regarded "the Irish marketplace as too small and immature for competing innovative e-finance offerings to exist profitably, if they target the Irish market only"⁷⁷. The report found that "the larger players are still following a largely defensive strategy, without much conviction that the Internet will significantly help them to grow new customers on the B2C front"⁷⁸. However the report did predict that "online purchasing and transacting among the corporate and SME sectors is expected to grow significantly over the next 2 years"⁷⁹. While industry players may believe that the Irish market is too small to support innovative online offerings, attempts to service the European market from Ireland have not been hugely successful either. The Internet bank, First E, owned by Enba closed in September 2001.

For Ireland, the most important developments are more likely to be in the development of ePayments than in online banking. The Department of the Taoiseach has currently put in place a group to look at the development of Ireland's ePayment infrastructure, as the adoption of ePayments could provide significant savings for the Irish economy.

Tourism – Internationally, tourism and travel services have been one of the major success stories of B2C eBusiness. In Ireland Ryanair.com has become one of the most successful travel sites in Europe. In the 12 months to April 2002, 85% of its ticket sales were via the internet.⁸⁰ In the light of the economic slowdown and its impact on the tourism sector, the Internet will offer a useful tool to Irish companies to market Ireland as a tourist location.

Education – Education is a sector where there is a real opportunity for Irish companies to leverage Ireland's international reputation for educational excellence to sell eLearning products and services. The global downturn may prove of benefit to e-learning companies as large corporates adopt e-learning to reduce training costs.

Logistics and Fulfilment – While the leading players in the Irish market compare well with their international counterparts, the sector as a whole lags the international leaders for this sector. The majority of Irish haulage firms are still small operators without the expertise or the resources to adopt eBusiness.

Food and Agribusiness (including Food Retail) – Food Retailing has been one of the successes for Internet Retailing. For example, the UK-based supermarket chain Tesco is now the second largest Internet retailer in the world. In Ireland, both Tesco and Superquinn have launched online services. Tesco now has on-line offering, which is available in Dublin, Cork, Galway, Waterford, Limerick, and Clare, reaching a potential market of 685,000 homes in total. Superquinn have expanded their online shopping offering to include gifts and drink and is now serving customers in Dublin, Kilkenny,

⁷⁶ *A Snapshot of Online Financial Services in Ireland Prospectus Strategy Consultants 2001.*

⁷⁷ *Ibid.*

⁷⁸ *Ibid.*

⁷⁹ *Ibid.*

⁸⁰ *ryanair.com.*

Carlow, Clonmel and Dundalk. On-line store buy4now.ie has reported good progress on sales growth for the first quarter of 2002. The expansion of online shopping in the Irish market contrasts with international developments where Webvan, the best funded of all the dot-com companies collapsed after spending \$1bn of investors' money. The company announced on 16 July 2001 that it would file for Chapter 11 protection, delist from NASDAQ, and lay off its 2000 staff.

IngredientsNet.com, the joint venture funded by Fyffes and Glanbia went out of business. IngredientsNet.com was a business-to-business marketplace for the food ingredients sector.

In the Agribusiness sector one of the major challenges going forward will be the issue of the ability to trace food products from primary producer to the consumer's table. The application of eBusiness technologies to this challenge could give Ireland a major competitive advantage in the future.

Digital Content and Intellectual Property Management – The creation of the Digital Hub in Dublin's Liberties area is designed to create a supportive environment for the development of the this sector. The Digital Hub strategic plan was launched in December 2001. In addition, the Global Crossing initiative has provided Ireland with the necessary connectivity for international firms to use Ireland as a centre for the digital distribution of content.

Chemicals and Pharmaceuticals (including Biotechnology) – This sector in Ireland has not been a leader in the adoption of eBusiness. As more R&D type activities are attracted to Ireland, this will change as eBusiness technologies play a major role in pharmaceutical research (that is, to ensure compliance with Government safety regulations, and to improve secure information sharing).

Need For Targeted Development

Table 1 reviews the stage of eBusiness adoption in key sectors of the Irish economy relative to best practice based on Accenture analysis.

Table 1 *Relative Sectoral Rate of Adoption of eBusiness*

SECTOR	Late Adopter			Early Leader	
	1	2	3	4	5
Software					
Electronics Hardware					
Dot-coms					
Non-food Retail					
Financial Services					
Tourism					
Education					
Logistics & Fulfillment					
Food and Agribusiness					
Digital Content & Property Management					
Chemicals & Pharmaceutical					

The software and electronic hardware sectors are the leading sectors in Ireland. The key sectors where Ireland needs to move quickly are in Financial Services (ePayments), Logistics and Fulfillment, Food and Agribusiness, Digital Content and Intellectual Property management, and Support Services.

6 Summary of Key Recommendations

This section presents a summary of the key recommendations of this report. The recommendations are designed to position Ireland to take advantage of some of the key emerging trends in eBusiness and to improve the overall business environment for eBusiness in Ireland.

6.1 Key Emerging Trends

mCommerce

Action	Responsible
Encourage the roll-out of a 3G network in one of the regions to facilitate research in mCommerce.	Department of Communications and Natural Resources/Commission for Communications Regulation/ Department of Enterprise, Trade and Employment
Encourage Irish software firms to focus on attractive niches in the mCommerce value chain.	Enterprise Ireland

eMarketplaces

Action	Responsible
Following an analysis of eMarketplace service providers, conduct a targeted marketing campaign to position Ireland as a B2B exchange location.	IDA
Encourage Irish software companies to develop products that fill gaps in the B2B value chain.	Enterprise Ireland
Encourage Irish software firms to form alliances with the major providers of exchange infrastructure.	Enterprise Ireland

Digital Asset Management (DAM) and Digital Rights Management (DRM)

Action	Responsible
Encourage Irish software companies to create enabling technologies for DAM and DRM.	Enterprise Ireland
Seek to build relationships with international media and eLearning companies, and position Ireland as a centre for the delivery of rich digital content to both Europe and the US.	IDA
Encourage international media companies to locate their back-office functions for digital content services in Ireland.	IDA
Encourage the providers of netsourced DAM solutions to locate in Ireland.	IDA

Networking/Data Centres

Action	Responsible
Educate Irish firms in the benefits of netsourcing, and, where appropriate, encourage firms to consider using netsourcing solutions.	Enterprise Ireland/IDA
Encourage the formation of alliances between Internet data centre operators and IT services providers in order to deliver managed services.	Enterprise Ireland

Voice Technologies

Action	Responsible
Encourage Irish software companies to create voice technologies.	Enterprise Ireland
Examine the potential impact of voice technologies on the call centre industry in Ireland.	Enterprise Ireland/IDA

6.2

The eBusiness Environment

Government Policy

Action	Responsible
Create and implement a national ePayments Strategy.	Department of the Taoiseach
Set out clear deadlines for the implementation of eBusiness policies and publish progress reports on a regular basis.	Department of the Taoiseach/ Department of Enterprise, Trade and Employment
Formulate a comprehensive eHealthcare strategy.	Department of Health and Children
Continue to encourage the adoption of eBusiness by Irish businesses and the implementation of eGovernment.	Department of the Taoiseach/ Department of Enterprise, Trade and Employment/Department of Communications and Natural Resources/Forfás
Develop comprehensive public web site pages to inform both the international marketplace and Irish business of progress on implementing eBusiness/eGovernment goals and targets achieved.	Government

eGovernment

Action	Responsible
Set out an aggressive timetable for the implementation of the eBroker initiative.	Government
Put in place an enhanced governance structure for the co-ordinated delivery of eGovernment services.	Department of the Taoiseach
Ensure the REACH team has adequate resources to fulfil its mandate.	Government
Prioritise an eProcurement programme for government as a flagship project to be in place by mid-2002.	Department of Finance
Put in place a structured communications programme to explain the benefits of eGovernment to all stakeholders	REACH

Legal and Regulatory

Action	Responsible
<p>Create an overarching strategy for eBusiness legislation in Ireland, which focuses on creating competitive advantage for Ireland through appropriate legislation. Among the elements this strategy must address are to:</p> <ul style="list-style-type: none"> • Create a forum to enable policymakers, legislators, and industry to discuss eBusiness to ensure a co-ordinated and business-friendly approach to domestic regulation and EU directives • Create a proactive regulatory environment in Ireland to help shape EU legislation and establish a strong lobbying organisation in Brussels to shape EU directives at an early stage • Identify a distinctive approach to the incorporation of EU directives into Irish law in order to gain competitive advantage. 	Department of the Taoiseach/ Department of Enterprise, Trade and Employment/Department of Communications and Natural Resources/Department of Justice, Equality and Law Reform
Select and provide special training for a number of judges who would then adjudicate on cases involving information technology and intellectual property law	Judiciary
Ensure the licensing regime for Digital Terrestrial Television encourages the deployment and use of interactive services.	Commission for Communications Regulation
Assess the possibility of creating another domain name registry in Ireland to promote competition.	Department of Communications and Natural Resources
Ensure that IE Domain Registry Ltd continues its drive to create a more business-friendly service for Irish business.	Department of Communications and Natural Resources

Support Services

Action	Responsible
Increase the marketing drive to position Ireland as a centre for Data Centre Services, Managed Services, and Disaster Recovery	IDA
Work with existing outsourcers and new entrants to position Ireland as a centre for international outsourcing operations	IDA
Encourage the operators of Internet data centres to move up the value chain and provide Managed Services	IDA/Enterprise Ireland
Continue to ensure that there is an effective, and co-ordinated, deployment of regional broadband infrastructures and services	Department of Communications and Natural Resources
Consider the use of tax incentives to encourage investment in open access broadband infrastructure	Department of the Finance/ Department of Communications and Natural Resources
Agree and execute an implementation strategy for electronic payments	Government/Banks/An Post/Utilities

Financial Environment

Action	Responsible
Encourage US venture capitalists, especially specialist venture capitalists, to locate in Ireland. This would provide access to funding, expertise and international contacts.	IDA/Enterprise Ireland

ICT Adoption

Action	Responsible
Reposition programmes to educate SMEs about eBusiness to focus on achieving competitive advantage through eBusiness adoption.	Enterprise Ireland
Integrate eBusiness into all of the services offered by agencies.	Enterprise Ireland/IDA
Encourage the roll-out of broadband to the regions.	Government

Research and Development

Action	Responsible
Continue to market Ireland as a centre of R&D among the existing client base and potential new clients.	Science Foundation Ireland/IDA
Encourage international researchers to work in Ireland.	Science Foundation Ireland/ IDA/Enterprise Ireland

Skills

Action	Responsible
Actively pursue the implementation of the actions and recommendations for the development of eBusiness skills contained in the Expert Group on Future Skills Needs' <i>Report on eBusiness Skills</i> and the <i>Third Report of the Expert Group in Skills Needs</i> .	Government
Proactively market Ireland as a location for foreign IT and software professionals (both EU and non-EU) who wish to build skills and develop their careers.	FÁS
Develop linkages with third-level colleges worldwide to source talent.	Department of Education and Science
Jointly develop eBusiness skills partnerships mechanisms to facilitate interaction between third-level institutions and business/industry and other interested stakeholders, e.g., trade unions.	Department of Education and Science
Implement the NCVA eBusiness course.	Department of Education and Science

Glossary

ADSL

Asymmetric Digital Subscriber Line. Access technology over the ordinary telephone copper cables that allows a maximum of 8 Mbit/s downstream towards the user and 640 kbit/s upstream.

ASP

Application Service Provider. A company that offers individuals or enterprises access over the Internet to application programs and related services that would otherwise have to be located in their own personal or enterprise computers.

Backbone

A high-capacity network that links together other networks of lower capacity, usually local area networks.

Bandwidth

(Also known as 'capacity') In simple terms, how much information or traffic can be carried on the telecoms infrastructure in a given amount of time. The simple rule is that the greater the bandwidth, the greater the opportunities for commerce.

Broadband

A high-speed telecommunications link, allowing transmission at 2 Mbit/s or higher.

Business to Business Exchanges/eMarketplaces

An eMarketplace is a digital forum that brings buyers and sellers together. On-line marketplaces can be directed at a specific industry such as the chemical industry, or a cross industry function such as procurement.

Connectivity

A term for the quality and quantity of connections between communications networks.

Digital Asset Management

DAM encompasses the strategies, technologies and processes required to create, store, retrieve, approve, distribute and leverage rich media content such as video, audio, images and graphics, as well as text.

Digital Cash/ePayments

Issued by a bank, this electronic currency or "e-cash" is numerical reference numbers, similar to serial numbers on real currency, that let buyers pay for a product or service electronically. It could be stored in a computer based "wallet" or smart card.

Digital Media/Content

Sound, pictures, text and video available in digital format for downloading or streaming across the Internet or other network.

Digital Rights Management

DRM enables the secure sale, distribution, and appropriate use of Digital Content. DRM focuses on the access rights, prices, and distribution rights that surround the content. It also deals with areas such as Public Key Infrastructure.

eBusiness

The exchange of value over a ubiquitous electronic medium. In this report, eBusiness is defined in its widest sense as including all aspects of business that takes place over networks such as the Internet. It includes goods and services that are delivered over these networks such as software and music, and goods ordered over the networks but delivered in some other way, such as personal computers. It covers the whole range of business functions required to support these activities from marketing to production to delivery and service and includes the hardware, software, content generation, telecommunications and support services that makes all this possible.

eCommerce

The application of email, EDI, electronic funds transfer, and other information-sharing technologies to conduct business online.

eGovernment

eGovernment is the application of the tools and techniques of eBusiness to the work of Government.

Email

Messages sent in digital form via the Internet or a private network.

eProcurement

The electronic linking of public sector purchasers with their suppliers to conduct any or all aspects of procurement.

Encryption

Using computer hardware, software, or both to transform data from its original form into a cipher (not readable) form for the purpose of security or privacy.

Extranet

A private network that uses Internet-based technology to link companies with suppliers, customers, and other partners.

GPRS

General Packet Radio Service. Mobile networks are rushing to adopt GPRS, which will offer a fast (144Mb/s) connection for the transmission of data. (GSM subscribers are currently limited to 9600Kb/s). Will open the door for Internet access on hand portable phones.

GSM

Global System for Mobile. A digital two-way cellular system developed in Europe and launched in 1991.

Hosting

Hosting, also known as Web site hosting and Web hosting, is the business of housing, serving, and maintaining files for one or more Web sites. More important than the computer space that is provided for Web site files, is the fast connection to the Internet.

ICT

Information and Communications Technologies are an intertwined set of technologies and services that mutually reinforce expanded benefits and efficiencies.

IDTV

Interactive Digital Television.

Internet

The interactive global network linking millions of computers, transmitting, storing and providing information for users.

Internet Data Centres (IDCs)

A Data Centre provides facilities for co-location, Web, and server hosting, network and support services. IDCs are the physical infrastructure, which enables netsourcing.

Internet Protocol (IP)

A technology to empower decentralised networks as opposed to centrally switched circuit switched technologies.

Internet Service Providers (ISPs)

Organisations which provide individuals and businesses with access to the Internet, (including commercial web sites). ISPs may be wholesalers or retailers or both. A wholesaler normally resells bandwidth and certain other services to smaller ISPs who act as retailers. The most significant component of the sale price is the amount of bandwidth purchased.

Intranet

Based on Internet technologies, an internal network that operates much like the World Wide Web, accessible only to employees and other authorised users and protected by a firewall.

ISDN

Integrated Services Digital Network. Usually offered in two forms – Basic ISDN and the faster Primary ISDN.

Managed Services

Managed services refers to the management of third-party applications within Internet data centres. These high value added activities involve the management of IT systems, business processes, and eBusiness on behalf of clients from a remote location using the Internet.

mCommerce

eBusiness using mobile technologies. mCommerce can be defined as extending eBusiness to anytime, anyplace, anywhere, typically using Internet-enabled mobile phones or other wireless Internet access devices.

Multimedia (frequently interactive multimedia)

The combination of sound, music, text and graphics in a way that encourages interactivity and a dynamic use of web based content.

Netsourcing

Netsourcing is the rental of business applications and process delivered by a third party over a network (usually the Internet).

Peering

Arrangements made between Internet Service Providers and Internet Exchange Administrators for the exchange of data traffic at Internet exchanges.

Pure-plays

Pure-plays are companies that are “born on the web”, that is, companies which are set up on the Internet and do not have a previous offline presence.

Reach

Reach was launched under the Minister for Social, Community and Family Affairs September 2000. The objective of Reach is to develop the framework for the integration of services and the implementation of eGovernment

Third Generation Mobile Services (3G)

The third generation of mobile telephony (known as Universal Mobile Telephone Service in Europe) is designed to be a worldwide broadband, digital system. It will offer wireless Internet access, moving video images, two-way text communication, and on-line transactions. Analogue and digital (e.g. GSM) systems were the first and second generations of mobile, respectively.

U-Commerce

Technologies generate revenues by making objects intelligent and interactive by using multiple technologies, concepts, and platforms. It is being driven by developments in low cost wireless communication devices which have a computer chip and antenna and can be applied or embedded within a package or device, sensor, display, and actuator technologies.

UMTS

Universal Mobile Telephone Service. The next generation of mobile telephones (see above).

WAP

Wireless Application Protocol – a protocol that enables Internet services to be delivered to small-screen mobile devices.

Web Page

A document on the World Wide Web.

Web Server

A computer that hosts Web sites and pages, can also refer to the specific software “serving” web pages from that computer: e.g., Apache, Microsoft or Netscape web servers.

Web Site

A location on the World Wide Web containing subject, or company specific documents, content and files.

World Wide Web

A system of Internet servers that support documents formatted in HyperText Markup Language (HTML), which allows electronic links to other documents and files.

Selected Forfás Reports

Reports Published by Forfás 2000-2002

The Dynamics of the Retail Sector in Ireland	January 2000
Enterprise 2010	January 2000
Survey of Research & Development in the Business Sector 1997	February 2000
Benchmarking Science, Technology & Mathematics Education in Ireland Against International Good Practice Irish Council for Science, Technology & Innovation (ICSTI)	February 2000
Proposals on Transport Infrastructure, the Planning Process and Public Transport National Competitiveness Council (NCC)	March 2000
The Second Report of the Expert Group on Future Skills Needs Responding to Ireland's growing skill needs	March 2000
Business Education & Training Partnership 2nd Forum, Dublin	March 2000
Management Development in the Republic of Ireland: Patterns and Trends	May 2000
Annual Competitiveness Report 2000 & The Competitiveness Challenge Report National Competitiveness Council (NCC)	May 2000
State Expenditure on Science & Technology, 1999	June 2000
Forfás Annual Report 1999	July 2000
Statement on Telecommunications, eBusiness and the Information Society National Competitiveness Council (NCC)	July 2000
Statement on Regulatory Reform National Competitiveness Council (NCC)	July 2000
Annual Survey of Irish Economy Expenditures	August 2000
Report on eBusiness Skills Report on In company Training Expert Group on Future Skills Needs	August 2000
Survey of Research in the Higher Education Sector 1998	September 2000
Statement on Labour Supply and Skills National Competitiveness Council (NCC)	September 2000
Telecommunications for eBusiness: A User's Guide	November 2000
Annual Employment Survey 1999	November 2000
International Trade and Investment Report, 2000	December 2000
The 4th Framework Programme in Ireland	April 2001

Commercialisation of Publicly Funded Research Irish Council for Science, Technology & Innovation (ICSTI)	April 2001
The Third Report of the Expert Group on Future Skills Needs Responding to Ireland's growing skill needs	July 2001
Forfás Annual Report 2000	August 2001
Annual Employment Survey 2000	September 2001
Statement on Outward Direct Investment	October 2001
State Expenditure on Science & Technology, 2000	December 2001
Research and Development in the Public Sector, 2000	December 2001
Key Waste Management Issues in Ireland	December 2001
The Competitiveness Challenge National Competitiveness Council (NCC)	December 2001
The Annual Competitiveness Report, 2001 National Competitiveness Council (NCC)	December 2001
The Labour Market Participation of Over 55s in Ireland Expert Group on Future Skills Needs	January 2002
International Trade and Investment Report	February 2002
Biotechnology Irish Council for Science, Technology & Innovation (ICSTI)	February 2002
Enlargement of the European Union Forfás Submission to the National Forum on Europe	February 2002
Broadband Investment in Ireland – Update 2002	March 2002
Research and Development in the Business Sector 1999	May 2002

Functions of Forfás

Forfás is the national policy and advisory board for enterprise, trade, science, technology and innovation. It is the body in which the State's legal powers for industrial promotion and technology development have been vested. It is also the body through which powers are delegated to Enterprise Ireland for the promotion of indigenous industry and to IDA Ireland for the promotion of inward investment. The broad functions of Forfás are to:

- ▶ *advise the Minister on matters relating to the development of industry in the State;*
- ▶ *to advise on the development and co-ordination of policy for Enterprise Ireland, IDA Ireland and such other bodies (established by or under statute) as the Minister may by order designate;*
- ▶ *encourage the development of industry, technology, marketing and human resources in the State;*
- ▶ *encourage the establishment and development in the State of industrial undertakings from outside the State; and*
- ▶ *advise and co-ordinate Enterprise Ireland and IDA Ireland in relation to their functions.*

Is é Forfás an bord náisiúnta um polasaí agus comhairle le haghaidh fiontraíochta, trádála, eolaíochta, teicneolaíochta agus nuála. Is é an comhlacht é a bhfuil comhactaí dlíthiúla an stáit maidir le cur-chun-cinn tionscail agus forbairt teicneolaíochta dílsithe ann. Is é an comhlacht é freisin trína dciomnaítear cumhachtaí ar Fhiontraíocht Éireann le tionscail dúchais a chur chus cinn agus ar ghníomhaireacht Forbartha Tionscail na hÉireann (GFT Éireann) le hinfheistíocht isteach sa tír a chur chun tosaigh. Is iad feighmeanna Fhorfáis:

- ▶ *comhairle a chur ar an Aire ó thaobh cúrsaí a bhaineann le forbairt tionscail sa Stát;*
- ▶ *comhairle maidir le forbairt agus comhordú polasaithe a chur ar fáil d'Fhiontraíocht Éireann, d'GFT Éireann agus d'aon fhoras eile dá leithéid (a bunaíodh go reachtúil) a d'fhéadfadh an tAire a ainmniú trí ordú;*
- ▶ *forbairt na tionsclaíochta, na teicneolaíochta, na margaíochta agus acmhainní daonna a spreagadh sa Stát;*
- ▶ *bunú agus forbairt gnóthas tionsclaíoch ón iasacht a spreagadh sa Stát; agus*
- ▶ *Fiontraíocht Éireann agus GFT Éireann a chomhairliú agus a chomhordú ó thaobh a gcuid feidhmeanna.*

Board Members

Peter Cassells
Chairman

Martin Cronin
Chief Executive, Forfás

Sean Dorgan
Chief Executive, IDA Ireland

Dan Flinter
Chief Executive, Enterprise Ireland

Paul Haran
Secretary General, Department of Enterprise, Trade & Employment

Professor Michael Hillery
Chair of Manufacturing Engineering, University of Limerick

Rody Molloy
Director General, FÁS

William Murphy
Partner, Tynan Dillon and Company

Feargal O'Rourke
Partner, Taxation, PricewaterhouseCoopers

Professor Yvonne Scannell
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Toni Wall
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Jane Williams
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