

Information and
Communications Technologies

OECD Information Technology Outlook



OECD 

HIGHLIGHTS OF THE OECD INFORMATION TECHNOLOGY OUTLOOK 2004

ICTs continue to play their important role in the world economy

Information and communication technologies (ICTs) play a pivotal role in the world economy. The ICT sector is increasing its trend share of economic activity, and ICTs are an important input for economic performance. The outlook for the ICT sector is improving, although more slowly than earlier foreseen. The slump that began in 2000 was severe in ICT manufacturing, while telecommunications services and information technology services continued to grow.

ICTs continue to play a pivotal role in the world economy, and the outlook for ICTs has improved markedly.

With ICT investment growing from the start of 2002, the United States led the way out of the downturn. As economic growth improves, the recovery in the ICT sector is spreading to Japan and Europe. Both the United States and Canada saw renewed growth of ICT goods shipments in 2002. Because semiconductors are a leading indicator of ICT hardware trends, the global upturn in semiconductors suggests that recovery is well under way, led by strong performance in China and Korea from the start of 2002. The upturn in investment has been concentrated in computers and components, but communications equipment is strengthening as the potential of high-speed broadband, WiFi, voice over Internet and video is exploited.

The recovery is spreading, underpinned by strong performance in the United States, China and Korea.

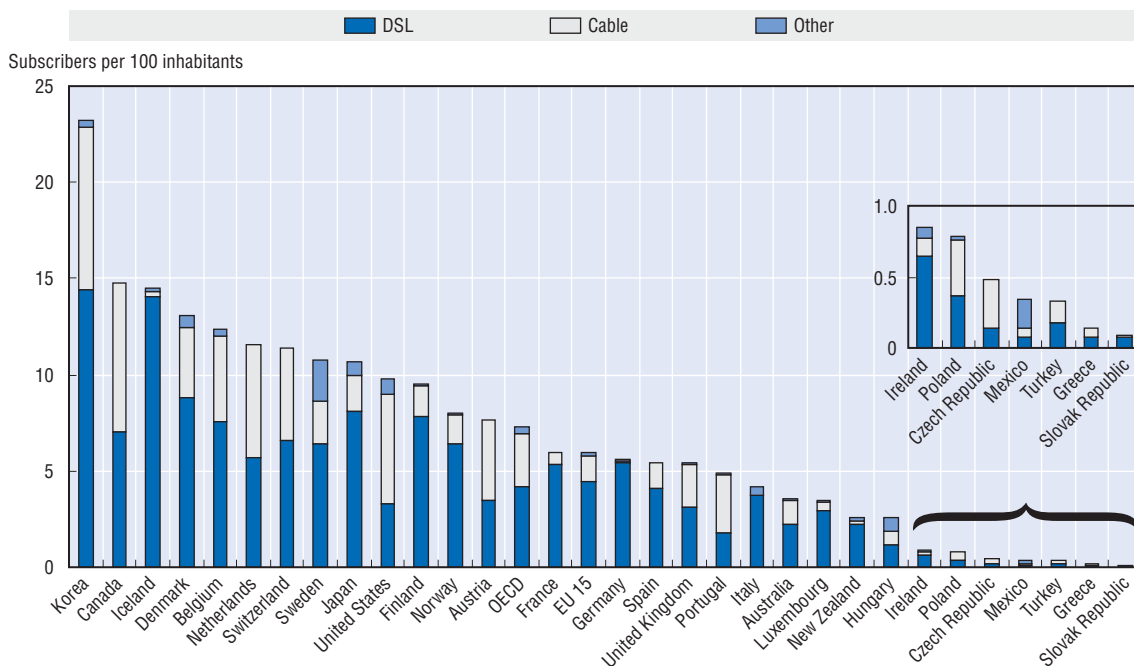
Revenues of the top 250 ICT firms worldwide, which make up over half of the ICT sector, were up in 2003, and they were in profit after very large losses in 2001 and 2002. Software, IT services and telecommunications services increased revenues by over 5% a year between 2000 and 2003, while communications equipment firms suffered very steep declines. Firms headquartered in the United States have close to 40% of OECD top firm activities, and the European Union and Japan one-quarter each. Japanese electronics conglomerates have fallen in the revenue rankings, while firms in Chinese Taipei, China and Singapore have risen. Concentration is increasing, as the largest firms increase their share of revenues. Revenues of the top 50 Internet firms (firms that derive all or most revenues from Internet-related operations) grew in current terms every year through 2003; their combined incomes returned to close to breakeven in 2003 after very large losses in 2001 and 2002, with larger Internet firms performing better than smaller ones.

The top ICT and Internet firms have returned to profitability, and concentration is increasing as they gain revenue share.

The ICT sector contributed close to 10% of OECD business GDP in 2001, up from 8% in 1995. It employed over 17 million people – over 6% of business employment – with 4% annual growth. Labour productivity has risen rapidly, mirroring output growth. Expanding segments such as telecommunications services have continued to grow, but manufacturing productivity has declined

Long-term development of the ICT sector, which takes over half of venture capital, is strong.

Broadband access per 100 inhabitants, 2002-03



Source: OECD.

from 2001. ICTs maintained their technological dynamism and leading sector role during the downturn. The sector attracted around one-half of all venture capital investment through 2003, spends one-quarter of total business R&D, and takes out close to one-fifth of all patents.

The production of ICT goods and ICT-related services are shifting towards Asia and China.

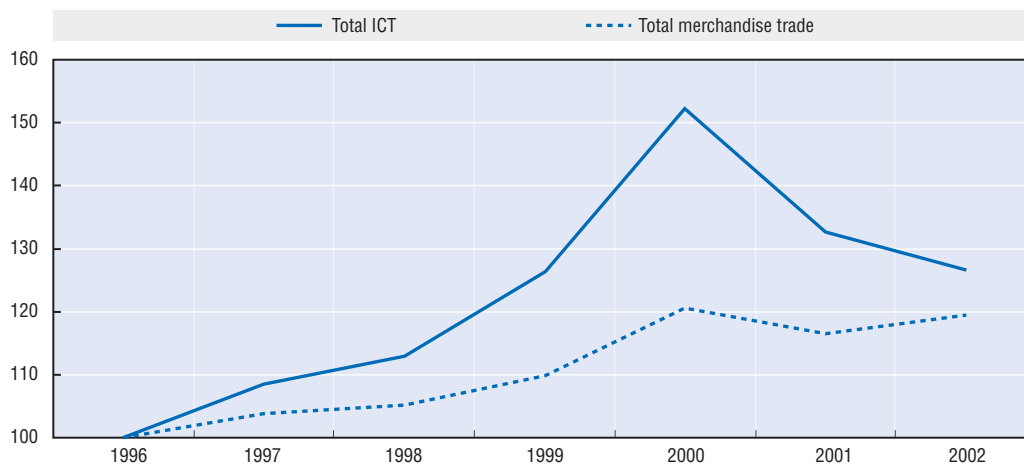
The global location of production of ICT goods has shifted, owing to the very rapid increase in output in China and other Asian countries. In 2002, the European Union, Japan and the United States accounted for less than two-thirds of global ICT goods production, compared with over four-fifths in 1990. There is evidence that IT services and ICT-enabled services are also changing their global distribution.

Global ICT trade is expected to grow strongly in 2004, driven by the global recovery. China's trade in ICT goods now exceeds Japan's.

In 2004 world trade is expected to grow at twice the rate of GDP, and trade in ICT goods and services even faster, with OECD ICT goods trade set to grow at 10% driven by higher GDP growth, particularly in Asia and the United States, rapid increases in China's trade, and trade in internationally sourced IT and ICT-enabled services. While ICT trade was severely affected by the economic slowdown, with OECD ICT goods trade dropping 13% in 2001 – compared with 3.3% for all goods – and by 4.5% in 2002. Nevertheless, ICT goods represented 14% of total trade in 2002, considerably more than in the mid-1990s. China's ICT goods trade has grown spectacularly since 1996: 28% annually compared with 4% for OECD. It is now greater and more balanced than Japan's (which is export-oriented) but still smaller than the United States (which is import-oriented).

OECD ICT goods trade and total goods trade, 1996-2002

Index 1996 = 100 Current USD



Source: OECD ITS database.

Trade in software and ICT services is difficult to track satisfactorily, but, as currently measured, Ireland and the United States continue to dominate. They are the largest exporters of software goods (trade in physical supports for software). Computer and information services trade has grown very rapidly in OECD countries, with exports growing by 20% a year and imports by 15% in the 1996-2002 period. Ireland had almost USD 10.4 billion in exports in 2002 compared to USD 6.9 billion from the United States.

Ireland is the leading OECD exporter of software-related goods and services, but these are difficult to measure.

ICT and Internet use are increasingly ubiquitous, and firms, industries and countries are reaping the benefits of ongoing ICT investments. However, growth has been uneven across firms, sectors and countries, with ICTs' contribution to growth conditioned by overall investment and economic performance. In most OECD countries, ICTs account for a large and growing share of investment and contribute significantly to GDP growth. The ICT-producing sector has contributed to productivity growth, especially in OECD countries with relatively large R&D-intensive ICT manufacturing sectors, but there is little overall evidence that ICT-using industries, except in the United States and Australia, have experienced more rapid productivity growth. ICT use is beneficial to firm performance when combined with complementary skills and organisation; firms that invest in a range of intangible and tangible assets experience superior growth.

ICT and Internet use are increasingly ubiquitous. Firms, industries and countries are reaping the benefits of ongoing ICT investments, but impacts are not uniform and are more apparent when coupled with appropriate skills and organisation.

The ICT sector is highly and increasingly globalised

Over the last two decades, the ICT-producing sector has become increasingly globalised. The sector's underlying structure and dynamics ensure its position at the forefront of globalisation, although the role of its different segments varies. Trade in ICT goods has grown at almost double the rate of merchandise trade and trade in ICT services even faster. The share of ICT goods in total trade has increased despite absolute declines in 2001 and 2002, and trade is growing faster than ICT spending and production.

The ICT sector is a leader in the globalisation of industry.

Global rationalisation of production has led to greater trade specialisation and high levels of intra-firm trade.

Driven by the global rationalisation of production, countries have specialised in smaller ranges of products and services, and in the 2001-02 downturn, countries specialised in ICTs became more specialised, while those that were not became less so. Intra-industry trade shows that the ICT equipment-producing sector is becoming more specialised, although the picture in the recent downturn was mixed. The ICT sector is characterised by high levels of intra-firm trade as firms rationalise internal production and develop more complex systems of global production and sourcing.

ICT firms expand internationally to gain market access and to access skills and technology.

The international expansion of ICT firms is driven by the need for market access, growth, economies of scale and access to skills and technology. Foreign direct investment (FDI) has increased significantly and investment stocks and international production by multinational enterprises (MNEs) have grown, although investment flows dropped from 2000. Detailed data on ICT FDI are limited, but show a shift towards globalising of services in the wake of deregulation and trade liberalisation. Telecommunication services are at the forefront of both investment and mergers and acquisitions (M&As), despite loss of share value and the cost of third-generation networks.

They expand largely through cross-border mergers and acquisitions; they led the boom and continue to be relatively active.

Cross-border M&As are the most common form of ICT expansion, enabling faster build-up than greenfield investment. During the surge in worldwide M&A activity in the 1990s, activity was much higher than average in ICTs owing to very large telecommunications deals and high stock market valuations. Despite precipitous declines, cross-border ICT M&A activity remains higher than in the mid-1990s and growing again in 2003 and the first half of 2004. As the business cycle picks up, surviving firms will seize acquisition opportunities to expand and consolidate.

International sourcing of IT and ICT-enabled business services has grown rapidly. Over three-quarters of exports are from OECD countries, but India is now an important exporter and other developing countries are following.

International sourcing of IT- and ICT-enabled business services – or offshoring – is a recent development and is driven by the dynamics of digital delivery, the need to fill skills shortages, increase efficiency and cut costs, in a context of increased competition and services liberalisation. Competition reinforces the trend, as other firms follow the leaders to lower-cost, high-quality locations with the available skills. There are no reliable official data on international sourcing, but most exports of computer and information services and other business services (IMF balance of payment categories) originate in OECD countries, although their share of total exports declined from 79.5% in 1995 to 77.1% in 2002. India as well as Ireland have significantly increased their shares of these exports and some developing countries are rapidly expanding their exports, albeit from very low levels.

While offshoring can increase firms' efficiency it raises concerns about job losses which are best addressed by ensuring that adjustment costs are minimised and that workers have access to new employment opportunities.

Offshoring delivers cost savings for firms, but it may also initially involve job losses in the home country and job creation in the host country. However, efficiency gains and cost savings underpin productivity growth and the creation of new employment opportunities in the home and host country. A protectionist response should be avoided in order to take advantage of the benefits of offshoring while managing the adjustment process: compensating for adjustment costs where necessary and enabling workers to seize new employment opportunities.

E-business is spreading but adoption of more complex applications is slow

In OECD countries, computers and the Internet are now widely diffused among firms. However, despite good access to computers and high levels of business connectivity, including broadband, there is relatively little implementation of ICT-enabled integrated business processes and adoption of more sophisticated on-line activities (e.g. taking orders on line, integration with suppliers). The challenge is to increase effective use internally and externally through the use of e-business software and changes in interactions with suppliers and customers.

Many firms still use the Internet mainly for information search, supply and on-line banking. Use for e-commerce varies by firm size (large firms lead), sector and country, and many e-business applications are not suitable for all processes and sectors. However, after the initial development of e-commerce with a domestic business-to-business focus by large firms in a few sectors, new trends are appearing. There is solid growth in business-to-consumer e-commerce, internationalisation is continuing, the Internet is being used to support off-line transactions, and small firms are moving towards more complex electronic business process applications including ordering and logistics systems.

However, relatively few firms have comprehensively adapted their business concepts, value chains, organisation, and supplier and customer relations. Internal integration of electronic order systems with other functions (e.g. marketing) or external integration with suppliers and customers remains infrequent and is often found only in large firms. As the “e-readiness” divide between small and large firms closes, a new “e-business divide” with respect to more advanced applications may widen, although part of the apparent slow

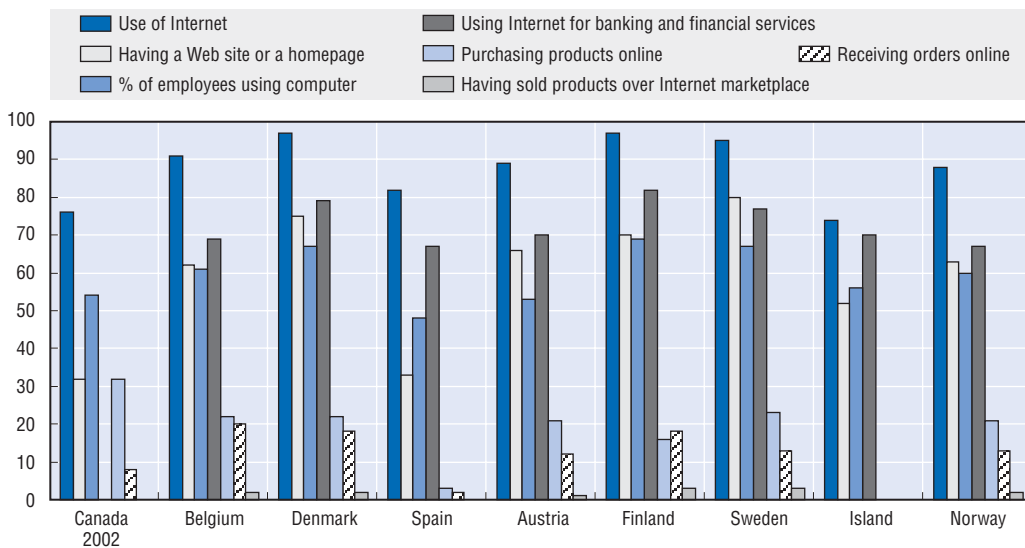
Computers and the Internet are now widely diffused, but integrated e-business processes are only slowly being adopted.

New trends include a shift to business-to-consumer e-commerce, greater internationalisation and a move by small firms towards more complex electronic business applications.

As the “e-readiness” divide between small and large firms closes, a new “e-business divide” may be widening for more advanced applications.

High business connectivity but low e-commerce adoption, 2003 or most recent year

Percentage of all firms



Source: OECD based on Eurostat, European Community Survey on ICT Usage in Enterprises, 2003, and Industry Canada, Survey of Electronic Commerce and Technology, April 2003.

diffusion of more complex e-business process applications may be due to relatively limited attempts to measure their uptake.

The potential of ICTs can only be realised by consistently improving skills and human capital, implementing organisational and product innovations, and aligning corporate and ICT strategies.

Furthermore, the effects of using e-business methods may not be immediate. Case studies for 2000-02 show the impact of e-business to be significant but consistently lower than expected, reflecting over-optimistic expectations and measurement difficulties. Cyclical factors are also important: firms look to ICTs to rationalise and cut internal costs during downturns and to expand externally and develop markets during upturns. Tapping the potential of ICTs throughout the business cycle requires consistently raising skills and improving human capital, implementing organisational innovations (*e.g.* new business models, flatter hierarchies) and product innovations, and aligning corporate and ICT strategies.

Firms with competitive advantages benefit from the use of more sophisticated forms of e-business along their value chains to improve efficiency and raise productivity.

There are clearly important differences in the intensity of e-business use among firms of different sizes and in different sectors. Measurement problems complicate the task of identifying causal relationships between increased corporate use of ICTs and their impact. However, firms that have competitive advantages, including a skilled and innovative workforce and openness to organisational change, benefit significantly from deployment of ICTs along their value chains. More sophisticated forms of e-business, involving internal and external process integration, promise efficiency and productivity payoffs.

Now that ICT access is widely available to individuals and households, the digital divide is becoming a “use” divide

Building on the installed base of PCs, the Internet and broadband have diffused rapidly to individuals and households.

Personal computers (PCs) and the Internet provide the equipment and connectivity that allow individuals and households to benefit from ICTs. PCs have diffused quite slowly in households, but, building on the installed PC base, the Internet has diffused quite rapidly and broadband technology is following at a similar pace. PCs are by far the main route for Internet access, but access via a mobile device is increasing, from a low level. While the patterns of PC and Internet uptake have been similar everywhere, levels differ significantly among countries.

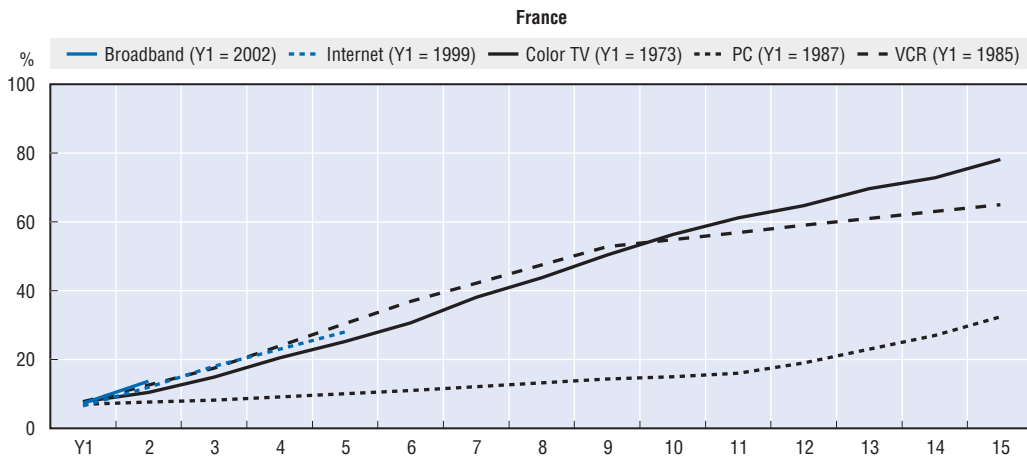
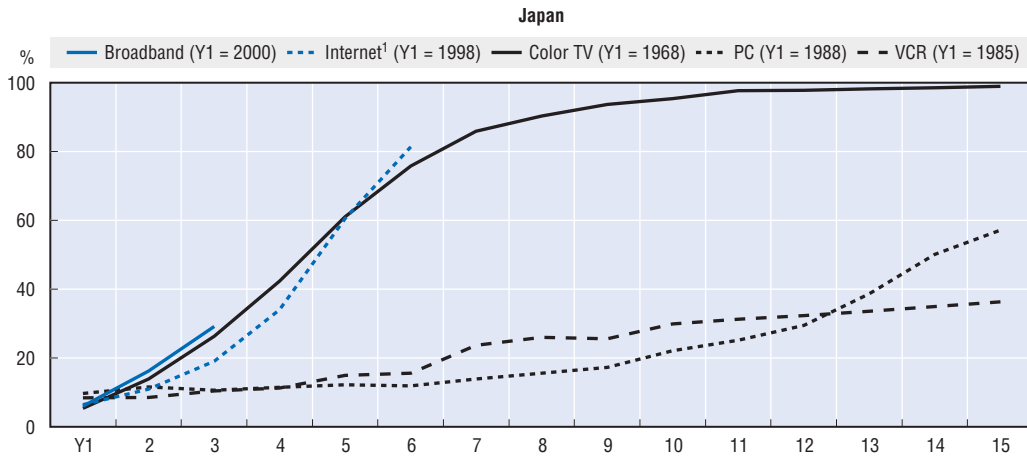
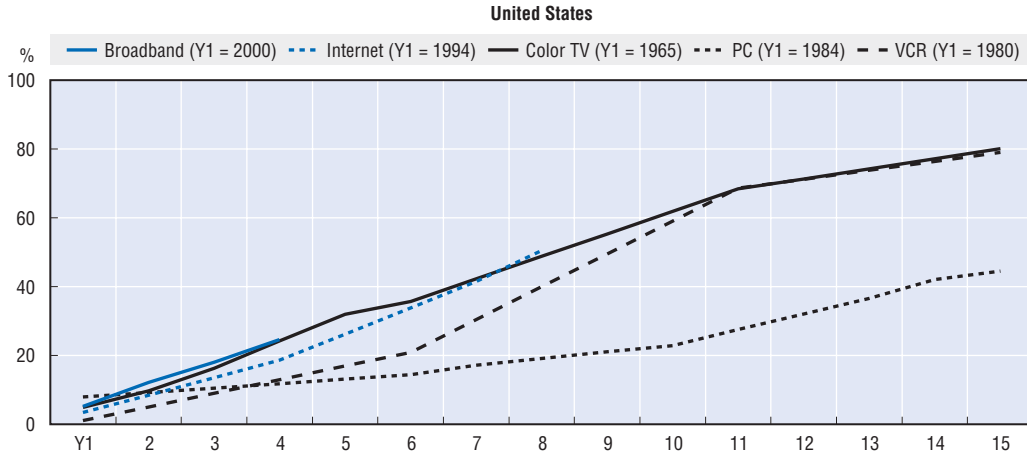
Home access leads workplace access, and Internet use is diversifying and reducing time devoted to other media.

ICT uptake is affected by income, educational attainment, children in the family, age and gender. Although home Internet access has led workplace access since around 1998-99, workplace users are more likely to have access at home. Lack of need or interest and costs are the main reasons for not being equipped. Internet use is also evolving, influenced by the supply of broadband and new access devices, and by educational attainment on the demand side. The Internet's capabilities for focused information search, obtaining news, and personal banking and investment are increasingly exploited, although e-mail remains the principal activity., and browsing for information on goods and services is becoming important for off-line shopping. Time spent on line is increasing and is affecting time devoted to other media, although television still has by far the greatest share.

A “use” divide is replacing the “access” divide.

ICTs are now in daily household use in OECD countries, despite a persistent if narrowing digital divide. Socio-economic characteristics determine how people interact with ICTs. Differences are increasingly linked to unequal use, and the digital divide is progressively shifting from a simple

PC, Internet, broadband and consumer goods penetration after reaching 5% of households



1. Share of households using the Internet. Access devices include PCs, mobile phones, personal digital assistants, Internet-capable video game consoles, TVs, etc.

Source: OECD, based on data from INSEE (France); Economic Planning Agency and MPHPT (Japan); US Department of Commerce and Nielsen Media Research (United States), and OECD estimates.

and slowly reducing “access” divide to a more complex “use” divide. The Internet amplifies social differences as new uses emerge. This suggests that attention should increasingly be paid to “how to use” issues.

Public policy can both encourage competition and enhance diffusion and use.

Public policy focusing on a mix of connectivity, content and education and distribution issues will help maximise the benefits of ICTs. Policies need to focus on an appropriate mix of infrastructure supply-side measures (competition to reduce prices, improve quality and expand choice) to raise connectedness, with demand-side measures to enhance diffusion and encourage content provision, and related broader measures involving education, training and literacy to tackle issues beyond the narrower issues of ICT supply and connectivity.

Products and information are increasingly digitised and delivered over information networks

Digital delivery is increasing rapidly across many sectors.

Digital delivery via the Internet and other computer-mediated networks is increasingly important for distributing information and commercial products. It combines greater market reach with richer interaction with customers and consumers and its level and complexity are increasing with more widespread adoption of broadband technologies. In spite of the rapid growth of digital delivery, its applications, impacts and prospects are not covered in ICT statistics; new measurement techniques may be needed to capture digital transactions.

Internet visit patterns show a very wide range of activities and large potential for digital delivery.

The potential for digital delivery is evident in the millions of Internet visits. These are most frequent in the categories computer and Internet, adult, news and media, entertainment, and shopping. Health and medical and government have relatively low shares of visits but are high among non-recreational uses, and number of visits is not necessarily a measure of utility or quality. In some categories, market shares are already very concentrated. Established business and finance firms attract a large share of visits, but new Internet firms take the top positions for shopping and classified and employment categories.

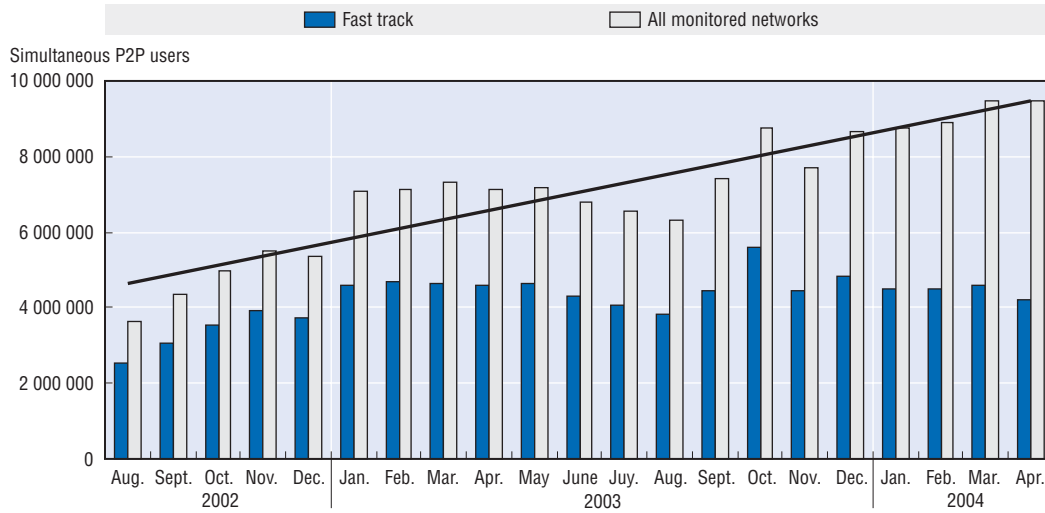
Peer-to-peer has grown rapidly to around 10 million simultaneous users.

Peer-to-peer (P2P) network use in OECD countries is a rapidly developing area of digital delivery. With approximately 10 million simultaneous users worldwide at any one time, it has a significant impact on network traffic, particularly with the current shift from audio files to larger video files. Factors determining the intensity of P2P use include availability of broadband (mainly for the size of files exchanged), student status, age (younger Internet users are the most active users), and perhaps lower incomes. File sharing applications are also being developed in business areas that benefit from the electronic distribution of information and products.

Digital delivery of business services is driven by the potential for digitising services intermediates and final products and by outsourcing.

Digital delivery in business services is driven by the potential to digitise business service inputs on the supply side and by outsourcing on the demand side. For suppliers, these factors include the need to increase richness, reach and interaction with customers, globalisation of customers, and internal cost and efficiency. For firms purchasing business services, factors include competitive pressures, cost control, access to specialist skills and demand variability. Software and IT services sectors are the current

FastTrack and other P2P network simultaneous users, August 2002-April 2004



Black line is the trend for "All Monitored Networks".
 Source: OECD, based on BigChampagne data.

leaders, but all business services use digital delivery, particularly for document exchange and customer services. Infrastructure, including broadband availability, services standards and accreditation, and skills and employment all affect its spread. Digital delivery is more advanced in countries with well-developed network infrastructure and a strong business services sector

ICTs and digital delivery are increasingly used in healthcare for administration and routine tasks, as well as advanced medical specialisations. Applications in the areas of patient records and smart cards, digital imaging, distance monitoring and consultation, tracking threats from diseases like SARS, research, health education/training and evaluation are being tried out and show great potential. Drivers include cost containment, quality improvement, universal access to healthcare and international co-operation. Major impediments include the structure of health institutions and specialisations, legacy ICT infrastructure, insurance and payment schemes, and poor incentives to collaborate between those who pay and those who benefit. Although digital delivery technologies can help to integrate and reorganise health systems, there is as yet too little rigorous and consistent monitoring and evaluation of the benefits and costs of applications.

Many healthcare application are trial projects but hold promise in many areas and have the potential to help transform healthcare.

ICT skills play an ever more important role in the economy

ICT skills of different levels of complexity are widely used throughout the economy. ICT specialists (e.g. computer professionals, electronic engineers) represent a high share of employment in only a few sectors (office equipment and computers, precision instruments, electronic equipment, utilities and computer services). However, those who use ICTs intensively in their jobs (e.g. high-level technical professionals, office workers) make up a high share of employment in industries such as computer services, financial, insurance and

Various levels of ICT skills are increasingly and more intensively used throughout the economy.

wholesaling services, as well as the manufacturing sectors that employ ICT specialists. The importance of ICT-skilled employment at both the specialist and the user level has increased over time.

ICT-skilled employment is associated with higher levels of productivity.

The distribution of ICT skills is very similar in Europe, the United States, Japan, Korea and Australia. The distribution of ICT skills is similar to that of ICT investment, suggesting that use of ICTs in the workplace has sector-specific characteristics. At sector level, a large share of ICT-skilled employment is associated with a high level of value added per employee, a sign that use of ICT-skilled workers is associated with measurable economic benefits. The distribution of ICT skills throughout the economy is important for competitiveness, as effective use of ICTs in production and business processes is of crucial importance for countries' productivity and growth.

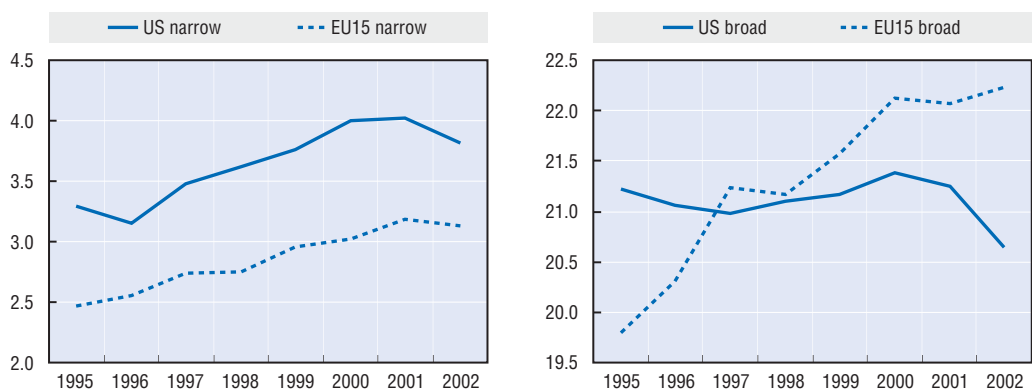
Full-time education is not currently the main source of ICT skills, and training and certification may be a more suitable way to develop specialist skills.

The need for ICT skills can be satisfied in part through education and training. Full-time education does not appear to be the most important path to obtaining general and advanced skills. As schools become well equipped, however, students develop at least basic ICT skills, and ICT-related degrees can be obtained through formal education. For specialist skills, however, sector-specific training and certification schemes may be more effective, given the rapid changes in skills needs and the constant introduction of new technologies.

The need for ICT skills can also be filled by outsourcing, which is increasing, or by migration, which has declined since 2001.

Skill needs can also be satisfied by domestic or international outsourcing or by migration. Outsourcing of IT services and ICT-enabled business activities is increasing, although the magnitude and geographical distribution of outsourcing depends on the reasons for doing so (skills needs, cost reductions, etc.), and no reliable official data exist. Most countries have encouraged inflows of IT migrants to some extent, although in many countries flows have diminished following the 2001 downturn. Internet recruitment is a new way of satisfying changing skills needs at firm level. It appears to be relatively more important and increasing in ICT-related fields and sectors, but it is not limited to these sectors and is increasing throughout the economy.

ICT specialists and ICT users in total employment, United States and EU15, 1995-2002
Percentages



Emerging technology applications underpin the future contributions of ICTs to the economy

Nanotechnology, grid computing, RFID, WiFi and anti-spam technologies are examples of maturing technologies that are finding increasing commercial applications. They add to the important role of ICTs in the economy through their potential contribution to growth, productivity and employment. As new applications emerge, issues such as information and system security, privacy and public safety have to be addressed.

Emerging technologies can increase the contribution of ICTs to growth and employment.

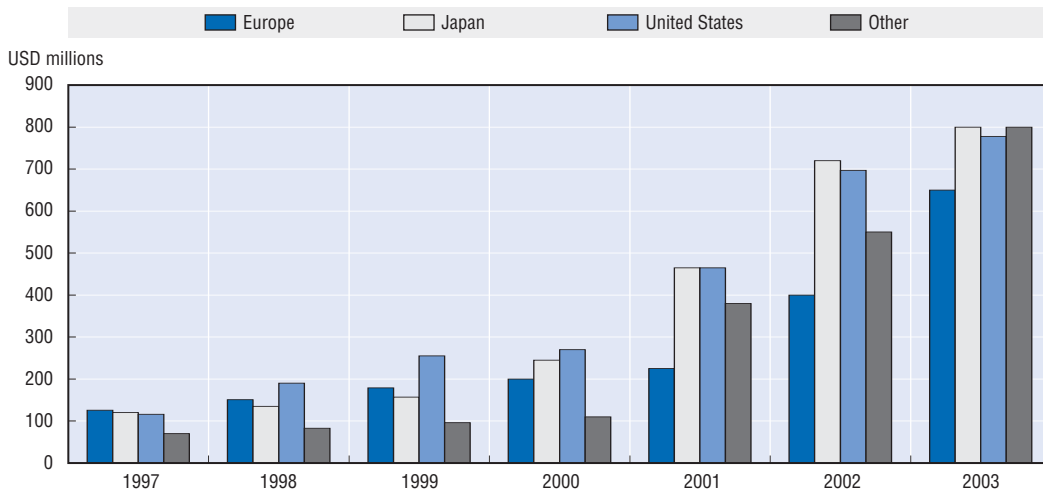
Drawing on expertise in biology, chemistry and physics, nanotechnology can improve the performance of ICTs and find uses across a broad range of applications (see graph). Although the potential economic benefits are widespread, further R&D is necessary to ensure that health, environmental and other risks are well understood. Grid computing has moved from the first linked mainframe computers and local area networks, and now focuses on exploiting the collective computing power of interconnected machines. The shared use of computing resources requires trust, established rules, grid resources and the protections of the data within the grid.

Nanotechnology and grid computing provide new ways of enhancing the impact of ICTs by providing greater capability at lower cost.

Radio frequency identification (RFID), first developed in the 1960s, is only now becoming practical for applications in industry, transport, security and consumer goods and services. RFID faces challenges in terms of data security and interception, and as a tracking technology it raises issues of privacy and authentication, for example for access or payment systems. WiFi is one of a group of emerging wireless ICTs that has attracted attention because of its ability to provide broadband Internet access. WiFi's flexibility and its "through-the-air" nature are its strong points, but they raise issues of encryption, access and protection of transferred data and free-rider concerns.

RFID and WiFi offer new tracking and communications potential...

Government nanotechnology R&D expenditure



Source: National Science Foundation, 2003.

... but control of spam is crucial for the continued development of the capabilities of the Internet.

Spam is now estimated to account for as much as 60% of all e-mail. This has spurred discussion of its economic costs and has led to efforts by policy makers, software firms and Internet service providers (ISPs) to stem the ever-growing tide. Spam raises concerns ranging from simple inconvenience to users, to issues of economic costs and its potential as a dangerous vehicle for computer viruses and cyber-terrorism. Filtering mechanisms adopted to counteract spam run into the problem of adapting to the ever-changing characteristics of spam while still allowing legitimate e-mail to pass.

More effective policies can help enhance the contribution of ICTs to growth and employment

ICT policies are increasingly integrated into economic development strategies and co-ordinated across government.

In recent years, national ICT strategies have shown considerable continuity, integrating ICT policies more closely with economic development to mainstream ICTs' contribution to growth and employment. This is reflected in the strengthening of the links between economic development and technology agencies in the organisational structure of policy-making bodies. At the same time, efforts have been made to ensure the co-ordination of ICT policies to maximise impact and broaden the use of ICTs, and more attention is paid to the evaluation of policies. Areas such as awareness and demonstration programmes and SME-specific programmes now receive less attention. The focus is moving towards more complex e-business strategies, and specific policies for SMEs have often been absorbed into general policies for ICT diffusion and training.

They focus on a few areas...

ICT policies focus specifically on R&D support and ICT innovation; particularly development and use of ICT skills; the impact of e-government; infrastructure, particularly broadband and areas such as authentication and digital signatures; and promoting trust, notably in the area of system and information security.

ICT policy priorities, OECD countries, 2003

General policies

ICT policy environment

Fostering ICT innovation

Research and development programmes

Government development projects

Increasing diffusion and use

Professional/managerial ICT skills

Government on-line, government as model users

Diffusion to individuals and households

Diffusion to business

ICT business environment

Competition in ICT markets

Intellectual property rights

Enhancing the infrastructure

Broadband

Electronic settlement/payments

Standards

Promoting trust online

Security of information systems and networks

Assessment and evaluation

Source: OECD.

On the supply side, there is a continuing focus on innovation, particularly ICT R&D programmes, in order to effect sectoral and structural transformations so as to more fully reap the benefits of ICT. On the demand side technology diffusion is of major importance, with increased attention to developing ICT skills and an emphasis on policies to promote professional/managerial ICT skills and to encourage ICT diffusion to businesses, individuals and households. Emphasis is also placed on providing government services on line, with governments seeking to develop streamlined, user-centred approaches that automate some aspects of public administration and also serve demonstration purposes across the economy.

Greater emphasis is placed on the development of broadband, in terms of infrastructure build-out and provision of high-speed service, with the most advanced countries focusing on ways to increase uptake of existing capacity, including raising the quality of Internet services. There is a new and rapidly growing interest in encouraging development of content and digital delivery with added value for users, and in exploiting public sector content (*e.g.* archives, weather, maps). Enhancing trust on line continues to receive attention, particularly for system and information security; and issues of protecting data, privacy and combating spam have gained importance.

Awareness of the fundamental importance of assessment and evaluation of ICT policies and programmes as a way to help inform government decision making and improve the effectiveness of policies and programmes has increased. There is growing emphasis on building assessment and evaluation into programmes from the outset, international benchmarking is often a feature of evaluations, and many countries are now looking at the broader context and evaluating the contribution of these programmes to economic development.

... R&D and technology diffusion, particularly the development of ICT skills.

Broadband has been a new focus, accompanied by growing policy interest in digital content and digital delivery.

Policy assessment and evaluation are increasing, and the contribution of ICTs to economic development is an important new focus.

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