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Working Party on the Information Economy

ICT DIFFUSION TO BUSINESS: Peer review

Country report: The Netherlands

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FOREWORD

In December 2004 this report was presented to the Working Party on the Information Economy (IE), as part of the peer review of ICT diffusion to business in the Netherlands. It was recommended to be made public by the Committee for Information, Computer and Communications Policy in March 2005.

The report was prepared by Desirée van Welsum and Graham Vickery of the OECD Secretariat. The series of peer reviews of ICT diffusion to business has been co-ordinated by Graham Vickery. It is published under the responsibility of the Secretary-General of the OECD.

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SUMMARY

The Netherlands has a good ICT infrastructure. It has a consistent market-led policy stance, and a cautious budget policy, which should provide a stable framework for more focused ICT policies. The high priority given to ICT R&D and innovation and to the diffusion of ICTs to businesses, and SMEs in particular, suggest that the Netherlands is aiming to create a strong position for the future. Attention is also being paid to creating the framework conditions that will allow an increase in the diffusion of ICTs to businesses, such as trust, security and privacy. However, specific policies to diffuse ICTs to business are also constrained to some extent by the general market-led approach to policy and by budget limitations. As a result of the reorganisation of ICT responsibilities, some areas have recently received higher priority and this report reflects these recent changes. Nevertheless, the government should continue its recent efforts to put in place a clear and transparent co-ordination and evaluation process. The following table summarises the analysis and recommendations developed in more detail in this report.

Policy domain	Current policy priority	This priority should be	Recommendations
Co-ordination of initiatives	High	Continued	Recent policy priority should continue to be given to the implementation of transparent policy coordination.
Infrastructure	High	Continued	The ICT infrastructure is well developed but needs continuous upgrading.
R&D and innovation in ICTs	High	Continued	Research and innovation in ICTs should be fostered and the government should continue its effort to bring research and industry together.
ICT Skills	Medium	Increased	The government should aim to strengthen ICT entrepreneurship and improve human capital, especially in the field of computer science and engineering. Attention to ICT skills, at various levels, should be increased.
Content creation	Low	Continued	The government should continue its current policy stance where it leaves content creation mainly up to the market, except in areas where it has a responsibility in ensuring the accessibility of reliable and socially valuable information.
Trust/security	High	Continued	The attention paid to trust and security issues should be continued as it forms part of the framework conditions for increased uptake of ICTs by businesses.
Demonstration/ awareness	High	Continued	The government should continue initiatives that encourage assessment of specific firm problems and exchange of information and experience to address these problems.
SMEs	High	Continued	The government should continue efforts aimed directly at increasing the diffusion of ICTs to business, especially initiatives such as visits in companies and other schemes to help SMEs identify their ICT needs and the best ways of satisfying them.
Evaluation	High	Continued	The government should continue its recent efforts to achieve transparent, continuous and systematic evaluation. The outcomes and recommendations should feedback into ongoing policies.

BACKGROUND

One of the findings that came out of the OECD Growth Study was that information and communications technologies (ICTs) are a key factor influencing productivity and growth (OECD, 2001a; 2001b; 2003, and 2004c). In 2001 the OECD Council Ministerial urged the OECD to strengthen its peer review of structural reforms. The 2002 Council Ministerial requested “the OECD to increase its monitoring of member countries' implementation of the recommendations of the OECD Growth Study”.

This report is part of the peer review process of policies promoting ICT diffusion to business, which has been designed to respond to the two Ministerial requests as part of the Growth Follow-up: Micro-policies for Growth. The OECD peer reviews are used as a method to bring together peers from member countries to discuss the policy experience and its main challenges in one country at a time. Once a critical mass of countries has been reviewed, a cross-country comparative synthesis report will be prepared with a view to identifying policy benchmarks. The reviews of the policies for the diffusion of ICTs to business are being conducted as part of the Working Party on the Information Economy (WPIE). The December 2003 meeting reviewed the reports for Finland, Korea and Switzerland. The reports for Italy and Norway were reviewed during the June 2004 meeting of the WPIE, and this report, together with the report for Denmark was reviewed at the December 2004 meeting of the WPIE.

This report reviews the status of *diffusion of ICT to business* in the Netherlands by examining the available indicators and describing the policies aimed at increasing ICT uptake in firms. This area was designated as the focus policy domain for this series of peer reviews. It is one of the five pillars of the ICT policy framework that was used in the *Information Technology Outlook 2004* Policy Questionnaire, as reproduced in Table 1. Given the complexity of the ICT diffusion process and the central role of a number of the other factors, attention is also given to the other parts of the framework (R&D, e-procurement, payment systems, standards, broadband trust and security) as they are important elements in the diffusion of ICT to business.

Table 1. The ICT Policy Framework

ICT Policies				
Fostering ICT Innovation	Increasing Diffusion / Use	Maintaining a Healthy ICT Business Environment	Enhancing the Infrastructure	Promoting Trust Online
R&D programmes	<i>Diffusion to households and individuals</i>	<i>Competition in ICT markets</i>	Electronic payment / settlement	<i>Security of information systems and networks</i>
Government development	<i>Diffusion to businesses</i>	<i>Intellectual property rights</i>	Standards	<i>Privacy protection</i>
Government procurement	Professional/managerial ICT skills	<i>Trade and FDI</i>	Broadband	<i>Consumer protection</i>
Venture finance	Organisational change	International co-operation	<i>General network infrastructure</i>	
Innovation networks	<i>e-government</i>			
	Content			
	Government demonstration			

Source: OECD (2004) *Information Technology Outlook 2004*, Policy Questionnaire.

The report presents recommendations for possible policy actions based on the strengths and weaknesses observed in the Dutch policy approach. Policies to encourage ICT diffusion to business cover traditional areas such as awareness-raising and publicly financed business services to develop ICT readiness in small and medium-sized firms, and also more general business environment policies such as competition policies. The review does not focus directly on broader aspects of Information Society policies aimed at citizens' and household's uptake of ICTs and participation in the Information Society. Furthermore, the review should not be seen as a comprehensive evaluation of the effectiveness of all recent initiatives, but as a guiding tool for facing the challenges and setting priorities for new initiatives.

PROMOTING ICT DIFFUSION TO BUSINESS IN THE NETHERLANDS

Introduction

Information and communications technologies (ICTs) are now generally recognised as a key factor contributing to productivity and growth. This was reaffirmed in *The New Economy, Beyond the Hype* (OECD, 2001b), in *Seizing the Benefits of ICT in a Digital Economy* (OECD, 2003), and more recently in *The Economic Impact of ICT – Measurement, Evidence and Implications* (OECD, 2004c), where the point was made that successful and productive adoption of ICT is closely linked to firms' innovative abilities and also requires good management. This was also confirmed in the study for the Netherlands, arguing that productivity gains from ICTs are linked to innovative activity, *i.e.* that ICTs are used more productively when they are combined with complementary innovation activity within the ICT-using firms (OECD, 2004c, Chapter 7). This confirms the need for reinforced ICT management skills and ICT entrepreneurship.

This review summarises the policies carried out in the Netherlands to promote the adoption of ICTs by the business sector. This is of particular importance for ensuring and enhancing future economic growth. While the ICT industry itself contributes directly to economic performance and growth, more widespread effects will come from diffusion and use of ICTs across all sectors.

Background data

The Netherlands in figures

The Netherlands had a population of 16.1 million in 2002. With an area of just over 41.5 thousand square kilometres, it is one of the most densely populated countries in the world with 387 inhabitants per square kilometre¹ (and as much as 477 if only land area is counted). It is a relatively wealthy country, with a GDP per capita of USD 26 900 in 2003.²

As OECD (2004f) reports, the Netherlands is gradually emerging from a recession, with growth picking up again from the end of 2003, although the numbers for the second quarter of 2004 were disappointing. Real GDP was expected to grow at 1.2% in 2004 and 2005. Most of this growth was expected to be export-led. Inflation was expected to remain relatively low, aided by wage moderation policies, and forecast to fall to less than 1% in 2004 and 2005. The following table summarises some indicators of the macroeconomic performance of the Netherlands in recent years, and the 2004 OECD (2004f) forecast for the near future. It shows that growth in the Netherlands has been slower than that of the Euro area and the OECD as a whole since 2000, and is expected to remain lower at least through 2005. It also shows that domestic demand and private consumption, in particular, have been very slow (with negative growth in 2003). Inflation is currently somewhat higher than for the average for the Euro Area and the OECD, but it is likely to come down to levels below those expected for these aggregates from 2004. Finally, while unemployment was expected to continue to increase in 2004 and 2005, it will remain well below the levels of the Euro Area and the OECD.

Table 2. Summary of macroeconomic indicators, selected countries, 1998-2005

In percentage change from pervious year (except for the unemployment rate)

	1999	2000	2001	2002	2003	2004	2005
GDP Growth							
NL	4.0	3.5	1.4	0.6	-0.9	1.2	1.2
US	4.4	3.7	0.8	1.9	3.0	4.4	3.3
Euro Area	2.8	3.7	1.7	0.9	0.6	1.8	1.9
OECD	3.3	3.9	1.1	1.6	2.2	3.6	2.9
Private Consumption							
NL	4.7	3.5	1.4	1.3	-0.9	0.1	0.2
US	5.1	4.7	2.5	3.1	3.3	3.6	3.1
Euro Area	3.5	2.9	1.9	0.8	1.1	1.2	1.6
OECD	3.9	3.8	2.1	2.3	2.2	2.9	2.5
Total Domestic Demand							
NL	4.3	2.6	1.8	0.5	-0.5	0.3	0.4
US	5.3	4.4	0.9	2.5	3.3	4.7	3.4
Euro Area	3.4	3.2	1.1	0.5	1.3	1.7	1.9
OECD	3.9	4.0	0.8	1.8	2.5	3.6	2.8
GDP Deflator							
NL	1.6	3.9	5.2	3.1	3.0	0.8	0.6
US	1.4	2.2	2.4	1.7	1.8	2.0	1.8
Euro Area	1.1	1.4	2.4	2.5	2.0	1.9	1.7
OECD	2.5	2.8	3.0	2.6	2.0	1.8	1.7
Unemployment Rate							
NL	3.5	3.0	2.5	2.9	4.1	4.9	5.2
US	4.2	4.0	4.8	5.8	6.0	5.5	5.3
Euro Area	9.4	8.4	8.0	8.4	8.8	8.8	8.6
OECD	6.4	5.9	6.2	6.7	6.9	6.6	6.5

Source: OECD (2004f).

Slow productivity growth has been a major concern of the Dutch government, especially in light of a slowdown in growth of labour inputs as a result of population ageing. This is illustrated by Figure A.1. in the Annex which shows that life expectancy at birth in the Netherlands in 2001 was relatively high, with both the total life expectancy and that for men being well above that for the average of the OECD and the EU15. Life expectancy for women was above that for the OECD as a whole, and somewhat below that for the average of the EU15. Thus, enhancing productivity growth also forms part of the objectives of the ICT diffusion policies. Similarly, work at the OECD (2004b, d and e) has identified raising productivity growth as a major challenge, and recommends policies aimed at strengthening entrepreneurship and competition, improving human capital and promoting innovation and research.

Industry structure

Finance, insurance, real estate and business services account for the largest share of value added in GDP in the Netherlands (over 26%), followed by community, social and personal services (over 22%), as shown in Table A.1. in the Annex. It also shows that the distribution of value added by sector in the Netherlands is very similar to that of the average of the EU15 and the OECD for services sectors, while some differences can be observed for manufacturing (relatively less important in the Netherlands than for the two aggregates) and mining and quarrying (relatively more important).

Net entry of firms in the ICT sectors computer and related activities, post and telecommunications, and manufacturing of office equipment and computers is relatively high in the Netherlands compared to other countries, especially for the first two sectors. Net entry rates for these two sectors are also higher than that for the total non-farm business sector. This is illustrated in Figure A.3. in the Annex showing net firm entry rates for the Netherlands and several other European countries.

The ICT sector in the Netherlands has relatively more small businesses than the economy as a whole, as is shown in Table 3 below. These shares have been very stable over the past decade.

Table 3. Share of SMEs in the economy, 2003

Percentage of businesses

	Total economy	Manufacturing	ICT sector ¹
Size ²			
Less than 5 employees	84.5	66.2	87.5
Less than 10 employees	90.5	75.9	92.2
Less than 50 employees	97.7	93.4	95.4

Notes: 1. The ICT sector is approximated by the sum of sectors NACE 30, 32, 64 and 72.

2. Includes SMEs without employees.

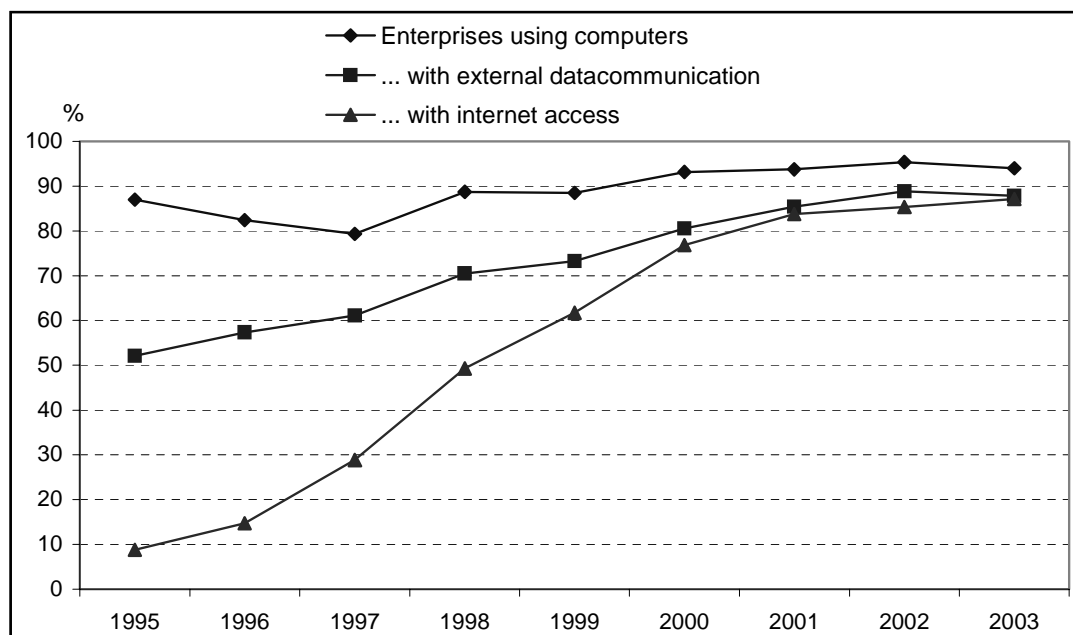
Source: OECD, based on CBS (Centraal Bureau voor de Statistiek), Statline (accessed May 2004).

According to the business organisations for SMEs in the Netherlands (<http://www.mkb.nl> and <http://www.vno-ncw.nl>), MKB-Nederland and VNO-NCW – Federation of Dutch Enterprises, 99% of private enterprises are SMEs (defined as businesses with 1-250 employees). There are 560 000 SMEs in total, 425 000 of which have less than 5 employees (around 76%), 69 000 employ 5-10 people, 52 000 10-50 people and 7 000 50-250 people. SMEs employ over 2.5 million people in total (around 60% of total employment in the business sector), of which 24% in the business services sector, 13% in retail trade, 13% in industry, 12% in care, 11% in wholesale, 10% in construction, 9% in car/repair, and 8% in hotels and restaurants. Finally, total turnover of SMEs amounts to around EUR 450 billion, around 50% of total business turnover.

Business use of ICTs

ICTs had reached a relatively high rate of diffusion by 2003 (Figure 1). The proportion of companies using computers has been around 90-95% for several years, Internet access started from a low level, but caught up quickly, and external data communication networks are also quite widely used by companies. Table A.2. in the Annex shows details on the diffusion of computers and the Internet in companies, by sector and by size. It shows that ICTs have diffused rather evenly across economic sectors, and that the use of ICTs tends to increase with company size.

Figure 1. Diffusion of ICTs to Dutch businesses¹, 1995-2003

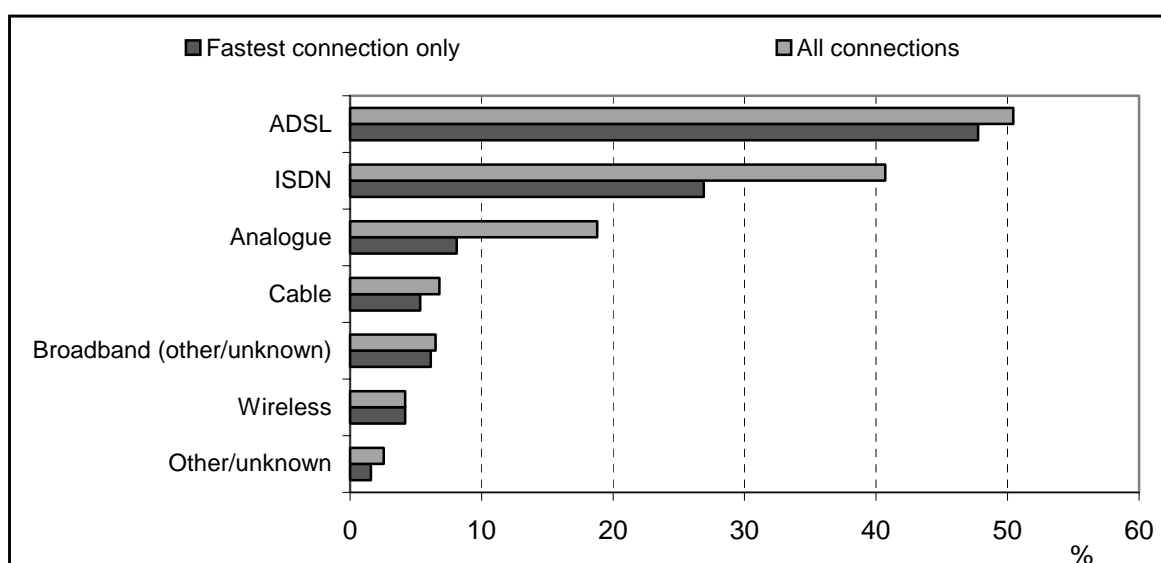


Note: 1. Percentage of businesses with 10 or more employees.
Source: CBS.

Figure 2 shows the type of Internet connection used by companies in the Netherlands in 2003. ADSL and ISDN connections were clearly favoured over other technologies (around 50% and 40% of companies respectively). Furthermore, bandwidth is growing and a number of companies have more than one connection. The technologically least advanced connection, by analogue modem, was still used by nearly 20% of companies in 2003, but for only 8% of companies did this constitute their fastest connection.

Figure 2. Businesses by type of Internet connection, 2003

Percentage of businesses¹ with an Internet connection



Note: 1. Businesses with 10 or more employees in NACE classes D to I, K, N, O.
Source: CBS.

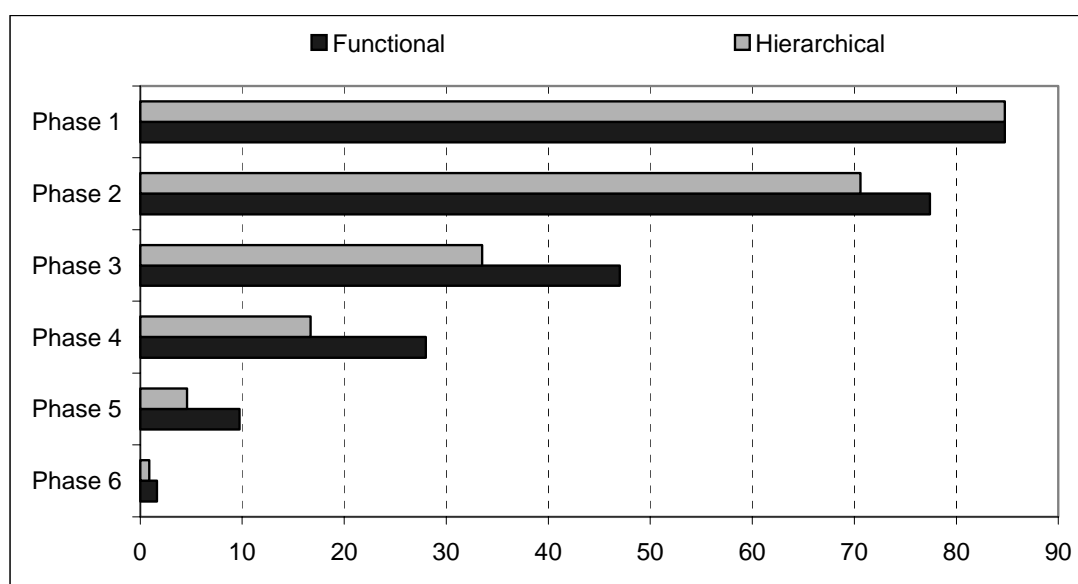
However, while ICTs have been diffused widely by now, this does not give any insights about what they are being used for. The next question is what companies actually do with these technologies. The CBS, (Centraal Bureau voor de Statistiek) has developed a method that allows a classification of companies according to the type and complexity of the use companies make of ICTs. They distinguish between six different phases of adoption of ICTs by businesses:

1. Presentation of the company on a Web site.
2. Provide product and price information on line.
3. Receive orders over the Internet or other electronic networks.
4. Electronic delivery of goods and services and/or customer support.
5. Reception of orders electronically coupled with other ICT systems within the company (financial, logistics, marketing).
6. Electronic order reception coupled with ICT systems of customers (stock administration).

The extent to which companies can be found in the various adoption phases, according to two approaches, is illustrated in Figure 3. The hierarchical approach considers that a company can only be in a phase if it also satisfies the requirements of the previous phase, whereas in the functional approach, companies can be in a phase without satisfying all of the requirements of a previous phase. Most companies are still in phases 1 and 2.

Figure 3. The use of electronic networks by adoption phase, 2001

Percentage of companies¹ that offer services² over electronic networks



Notes:

1. Businesses with 5 or more employees.

2. Web site, product or price information, electronic delivery of goods/services, customer support, order reception.

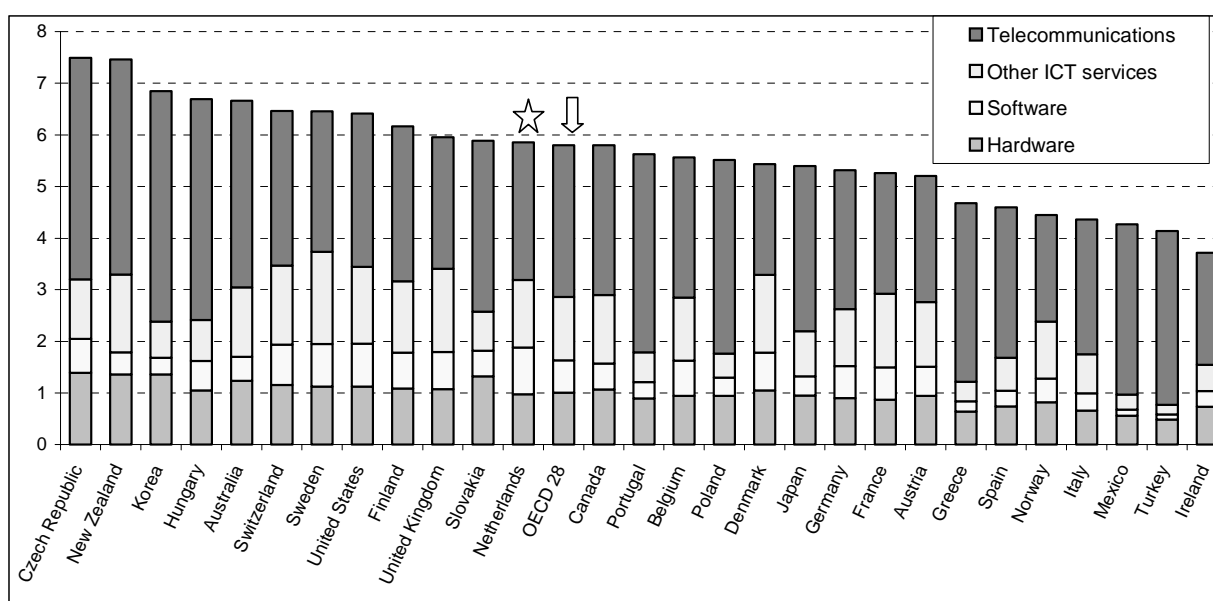
Source: CBS (2003).

CBS (2003) also analyses the uptake of ICTs, through the six adoption phases, by company size and by type of connection. Overall, there are relatively larger than small companies that have moved to more advanced adoption phases. An analysis by type of connection shows that adoption according to the more advanced phases increases with the capacity of the Internet connection.

ICT spending

Spending on ICTs is relatively high in the Netherlands – around the OECD average – as illustrated in Figure 4 which shows countries' ICT intensity, defined as the share of ICT spending in GDP, for OECD countries in 2003. It also shows that telecommunications constituted the largest ICT expenditure component in the Netherlands, after other ICT services, hardware and software.

Figure 4. ICT intensity, OECD countries, 2003



Source: OECD, based on data provided by the IDC (2004).

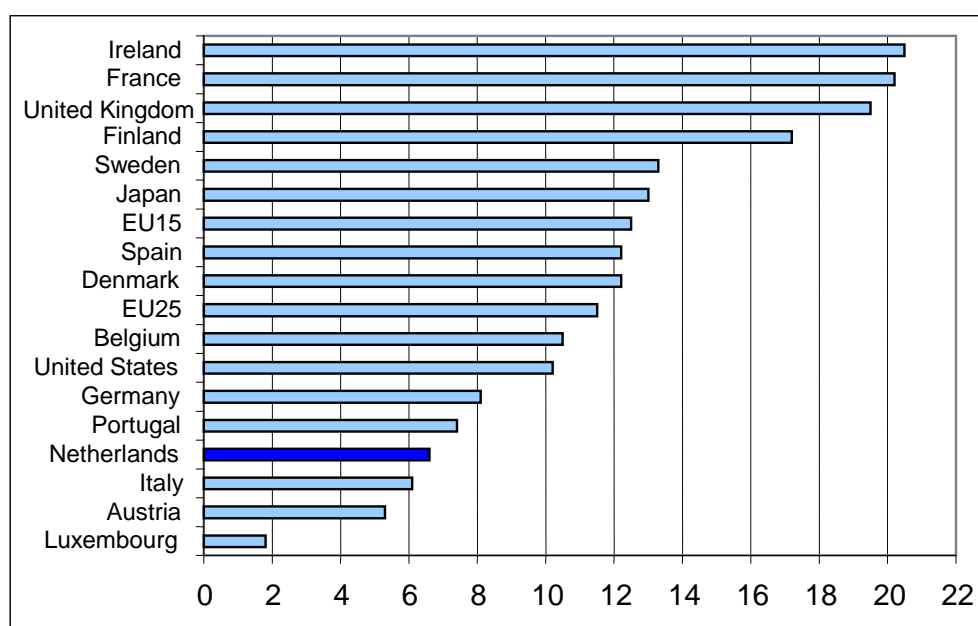
In terms of growth of spending on ICTs per inhabitant in USD, the Netherlands invests in ICTs in line with the OECD average (average annual growth rate of 6.8% and 6.7% respectively over the period 1993-2001). However, the absolute amount spent per inhabitant in the Netherlands is around 50% higher than that of the average for the OECD as a whole (USD 2 323 and USD 1 513 in 2001 respectively).

R&D and innovation

OECD (2004b) reports that high-tech entrepreneurship is not well developed in the Netherlands. This is identified by the report as an impediment to the diffusion of knowledge through science-based or high-tech start-ups, and constitutes one of the weak elements of the Dutch Innovation System.

OECD (2004b) also reports that as the number of Science and Technology graduates is very low in the Netherlands compared to most EU15 countries, as well as the United States and Japan, this may imply a limited availability of scientific staff in the future, which, in turn, will constitute an impediment to the future performance of the Netherlands in research and innovation. The situation is similar for Science and Engineering graduates, as shown in Figure 5 below.

Figure 5. Science and Engineering graduates (percentage of 20-29 age class), 2002 or latest year available¹



Note: 1. The number for Japan is an estimate (2001).

Source: European Innovation Scoreboard, 2004.

The number of researchers per thousand in total employment (total and business sector only) in 2001 for the Netherlands is well below the average for the OECD as whole, and particularly for researchers in the business sector. The Netherlands accounts for 1.2% of total OECD researchers (Figure A.4. in the Annex).

Some indicators of innovation activity are summarised in Table 4. Innovation expenditure in the services sector is very low in the Netherlands (and both services and manufacturing expenditure are below that for the average of the EU15 as a whole). Furthermore, the percentage of SMEs in the services sector involved in innovation directly in-house or through co-operation is relatively low in the Netherlands compared to many other countries included in the table. The Netherlands perform relatively better in the indicators for the manufacturing sector.

Table 4. Indicators of Innovation Activity, 2000 and 2001

	Innovation expenditure ¹		SMEs innovating in-house ²		SMEs involved in innovation co-operation ³	
	manufacturing	services	manufacturing	services	manufacturing	services
EU15	3.5	1.1	35.0	28.4	6.7	7.2
EU25	3.5	1.1	-	-	7.0	7.2
Austria	-	-	35.5	36.4	7.4	10.1
Belgium	4.9	0.9	46.2	31.8	11.7	7.7
Denmark	1.0	0.4	16.7	15.4	18.9	12.7
Finland	3.9	1.0	40.9	34.9	22.0	18.3
France	3.2	1.6	33.5	23.9	12.3	5.4
Germany	5.0	1.1	52.4	42.6	9.4	9.3
Greece	2.2	1.6	16.8	21.3	4.9	12.4
Italy	3.0	0.8	34.9	20.0	2.8	3.5
Luxembourg	2.1	1.2	38.8	39.6	-	-
Netherlands	3.1	0.8	42.5	28.1	11.1	8.5
Portugal	2.9	2.7	35.5	37.6	6.1	9.2
Spain	1.9	0.7	29.1	16.6	3.2	1.9
Sweden	-	-	35.5	35.6	14.1	12.8
United Kingdom	2.6	1.2	24.8	18.7	8.1	7.0

Notes: 1. Innovation Expenditure, percentage of all turnover in manufacturing and services, respectively (Eurostat).
2. SMEs innovating in-house, percentage of manufacturing and services SMEs, respectively (Eurostat, Community Innovation Survey, CIS3).
3. SMEs involved in innovation co-operation, percentage of manufacturing and services SMEs, respectively (Eurostat, Community Innovation Survey, CIS3).

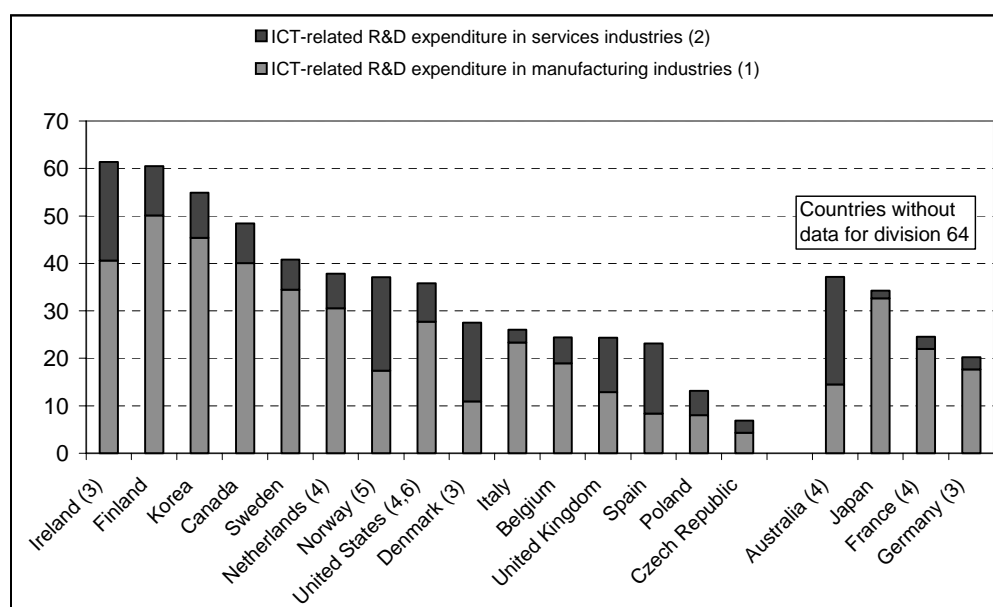
Source: European Innovation Scoreboard, 2004.

Another indicator of the extent to which firms are involved in innovation (taken from the European Innovation Scoreboard 2004) is given by 'sales of new to the firm but not new to the market' products (as a percentage of all turnover in manufacturing and services respectively). The Netherlands score very low on this indicator, especially in the services sector with 19.7% of manufacturing turnover (compared to 21.2% for the EU15 average) and 8.9% of services turnover (compared to 14.8% for the EU15 average). Another interesting indicator is given by 'sales of new to the market products' (as a percentage of all turnover in manufacturing and services respectively), where the result for the Netherlands is around that for the EU15 as a whole in manufacturing, but is again low compared to the average for the EU15 in the services sector. Sales of new to the market products represent 7.9% and 3.3% of total manufacturing and services turnover, respectively, in the Netherlands, compared to 7.8% and 4.3%, respectively, for the EU15.

The share of business sector R&D accounted for by SMEs in the Netherlands is very low compared to many other countries, although somewhat above that of the average for the OECD as a whole, in spite of relatively strong tax incentives (OECD, 2004e; Figure A.2. in the Annex). This is a concern for the government as the concentration of R&D activities in relatively fewer companies may form an obstacle to the diffusion of knowledge and new technologies throughout the economy.

The Netherlands has also relatively low R&D expenditure in the ICT services sectors, as well as total ICT-related R&D expenditure, as is illustrated in Figure 6 below.

Figure 6. R&D expenditure in selected ICT industries, 2001 or latest year available
Percentage of business enterprise sector R&D expenditure



- Notes:
1. ISIC, Rev. 3 divisions: 30 (manufacture of office, accounting and computing machinery; 32 (manufacture of radio, television and communication equipment and apparatus) and 33 (manufacture of medical, precision and optical instruments, watches and clocks).
 2. ISIC, Rev. 3 divisions: 64 (post and telecommunications) and 72 (computer and related activities).
 3. 1999 instead of 2001.
 4. 2000 instead of 2001.
 5. 1997 instead of 2001.
 6. Due to unavailability of data for division 64, class 642 (telecommunication) is included in services ICT R&D as a proxy. Available information shows that in the United States class 642 accounts for about 97-98% of division 64 total.

Source: OECD, ANBERD database, January 2004.

Recent research at the CPB (Centraal Planbureau) has found that ICTs can be instrumental in increasing companies' performance, and especially when combined with innovation (*e.g.* OECD, 2004c, Chapter 7, and van der Wiel and van Leeuwen, 2003). However, the Netherlands is not performing as well as would be desired on the innovation front. Furthermore, high-tech entrepreneurship in the Netherlands is not well developed (OECD, 2004b), limiting diffusion of new technologies and research through new firms. These issues represent some major policy challenges for the Dutch government in the future.

Infrastructure

Infrastructure: Telecommunications

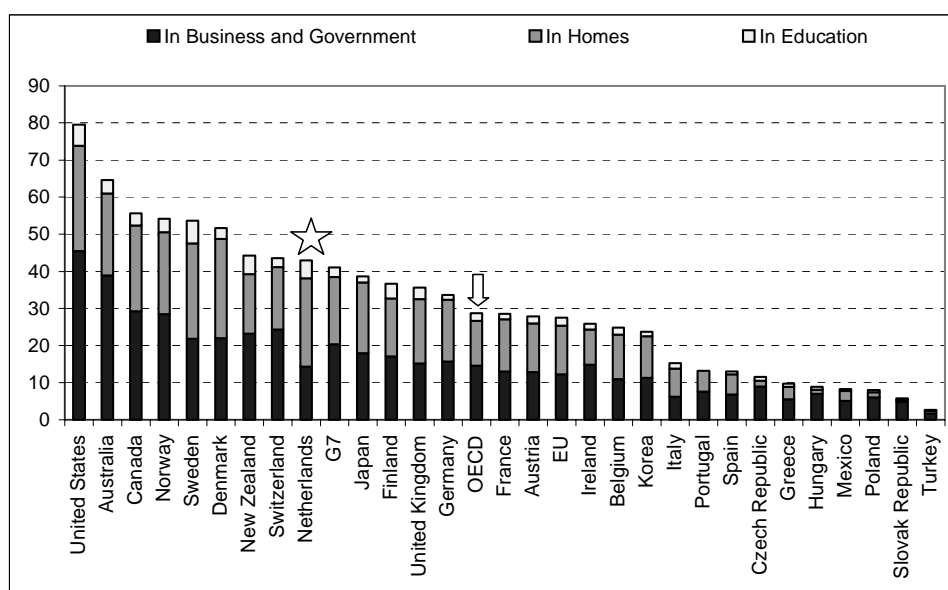
The infrastructure in the Netherlands is well developed, as is illustrated in Figures A.5.-A.10. in the Annex. The Netherlands scores higher than the OECD average for most of the indicators included (telecommunications channels, cellular mobiles, broadband subscribers, and the number of Internet users, all per 100 inhabitants), except for secure servers (per 100 000 inhabitants, Figure A.8.) and the number of people (per 100 inhabitants) who purchase goods and services over the Internet (Figure A.10.).

Infrastructure: PCs

The absolute number of PCs per inhabitant has been consistently higher in the Netherlands than the average for the OECD as a whole (1993-2001), reaching 43 and 28.7 PCs per 100 inhabitants in 2001, respectively. Nevertheless, the total number of PCs installed per inhabitant in the Netherlands grew more or less in line with the average for the OECD as a whole, with an average annual growth rate of 14.9% and 15.9% respectively.

The total number of PCs installed in business and government, in homes and in education, per 100 inhabitants in the Netherlands in 2001 was relatively lower than in most of the other countries at the top of the ranking (Figure 7).

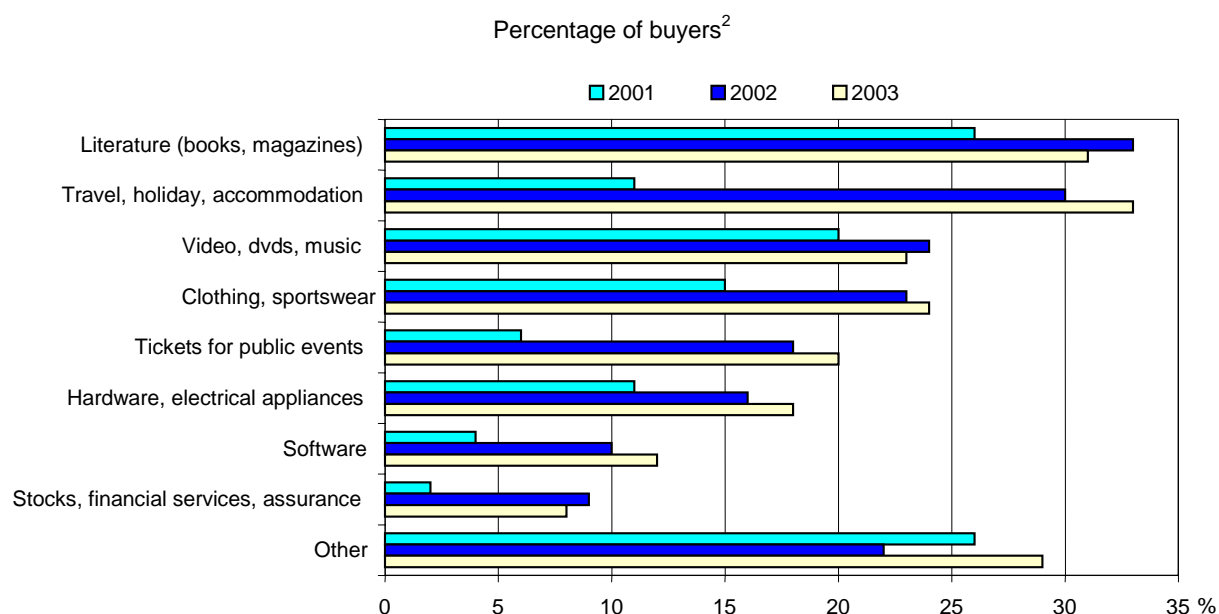
Figure 7. Total number of PCs installed per 100 inhabitants, OECD countries, 2001



Source: OECD, based on World Information Technology and Services Alliance (WITSA) / International Data Corporation, *Digital Planet 2002*.

E-commerce

The importance of e-commerce in the Netherlands is growing slowly, in line with other countries. The following figure shows which goods and services were most frequently bought on line by Dutch consumers in November 2001, 2002 and 2003. By 2003, more than 30% of online buyers used the Internet to buy books and/or for travel expenditures.

Figure 8. Goods and services most frequently bought over the Internet¹, November 2001, 2002, and 2003

Notes: 1. Goods and services that have been bought or ordered by the respondent in the three months prior to the survey.
2. The totals are greater than 100 as any one buyer can buy more than one good or service.

Source: CBS.

Indicators of e-commerce developments on the supply side are illustrated in Table 5. It shows that in 2003, as in 2001, around 30% of businesses with at least 10 employees reported the online ordering of products. The numbers on the electronic reception of orders are not comparable between 2001 and 2003, but both are relatively low. These data suggest that not much has changed in these two indicators of e-commerce on the businesses side up until 2003. No official data are available beyond that date.

Table 5. E-commerce development in businesses, 1995-2003

Percentages of businesses with 10 or more employees

	1995	1998	2001	2003
Internet access	9	49	84	87
Online ordering ¹⁾	-	23	29	29
Receiving orders electronically ²⁾	-	8	30	21

Notes:

1. 1999 instead of 1998.

2. The question on receiving orders electronically was changed in 2003. Not comparable with previous years.

Source: CBS.

ICT skills

Different levels of ICT skills can be acquired in different ways. The formal education system, combined with the general diffusion of ICTs in households, is likely to provide most students with at least basic ICT skills. Formal tertiary education provides for certain types of specialist ICT skills, although for those skills that are related to particular technologies and/or applications, which are likely to change rapidly over time, more flexible systems (such as public-private partnerships), as well as vocational

training (on-the-job) may be more suitable. This section compares the performance of the Netherlands in secondary and tertiary education and vocational training and then analyses the distribution of ICT-using occupations in the Dutch economy.

The Netherlands has a relatively high ratio of students to computers and relatively low use of ICT equipment in schools compared to in other countries (Table 6). The OECD International Survey of Upper Secondary Schools (ISSUS) (OECD, 2004a) collected new and detailed data on the integration of ICT equipment in the instruction of students at upper secondary schools participating in the survey. Some care should be taken in interpreting the results for the Netherlands as the international sampling requirements were not satisfied. It should also be kept in mind that the averages reported in the tables may hide large differences across schools and geographical areas. Table 6 shows various indicators of the extent to which students attending these schools are likely to be familiar with ICTs and have at least some basic ICT skills, in selected countries. The first three columns provide an indication of the availability of ICTs for students. The indicators for the Netherlands show that student access to ICTs is inferior to that in the other countries in the table. On average there is one computer available for more than 13 students, whereas in Norway, for example, less than 4 students have to share a computer. The percentage of computers that are connected to the Internet and local area networks is also relatively low, especially compared to Korea, Norway and Finland. The latter part of the table shows that by 2001, all students were attending schools where standard applications had been introduced, except for the use of e-mail systems in schools, which is relatively low in the Netherlands compared to the other countries in the table (only 78% of students attended schools where such systems had been introduced by 2001).

Table 6. Indicators of ICT equipment in upper secondary schools, selected countries, 2001

	Average ratio of students to computers for students' use	Average percentage of computers connected to the Internet	Average percentage of computers connected to local area networks	Percentage of upper secondary students attending schools where ...					
				... standard word processing and spreadsheet applications were introduced by		... Internet was introduced by		... an e-mail system accessible for teachers and students was introduced by	
				2001	by 1995	2001	by 1995	2001	by 1995
Finland	5.0	90	70	100	90	100	57	99	36
Italy	11.7	47	38	98	75	100	16	94	8
Korea	6.4	92	89	98	49	100	7	99	6
Netherlands ¹	13.5	73	72	100	65	100	16	78	<i>n</i>
Norway	3.7	91	74	100	93	100	39	99	22
Switzerland	9.0	82	73	99	93	99	20	94	6

¹ Country did not meet international sampling requirements. The reported data are unweighted.

Source: OECD International Survey of Upper Secondary Schools Database, 2003. See also OECD (2004d Chapter 6).

An indication of the types of skills that students attending upper secondary schools participating in the survey are likely to acquire is given in Table 7. Most students appear to use computers and perform basic tasks at least once a month as part of their course work. Relatively fewer students were required to use e-mail and some more specific applications.

Table 7. Use of ICT equipment in upper secondary schools, selected countries, 2001

Average percentage of upper secondary students attending schools where principals reported that various computer-related activities form part of students' assignments at least once a month

	Operating a computer (saving files, printing, etc.)	Writing documents with a word processor	Making illustrations with graphical programmes	Calculating with spreadsheet programmes	Writing programmes	Communicating via e-mail with teachers and other students	Sending, searching for, and using electronic forms of information
Finland	97	96	64	61	19	79	96
Italy	90	89	56	78	47	39	68
Korea	90	92	46	68	14	86	91
Netherlands ¹	99	99	39	63	9	48	82
Norway	99	99	66	82	21	67	88
Switzerland	93	91	57	70	14	52	82

Source: OECD International Survey of Upper Secondary Schools Database, 2003.

The Netherlands does not appear to score very high in terms of supplying people with more advanced ICT skills at the tertiary education level. The Netherlands has a very low percentage of tertiary education graduates in mathematics and computer sciences, as shown in Figure A.11. in the Annex (and similar to the picture obtained from science and engineering graduates in Figure 5 above). This may pose problems for ICT research and innovation in the future and may also imply future shortages of ICT specialists. Moreover, the percentage of female graduates in this field of study is very low, and much below the average for the OECD as a whole, as shown in Table A.3. in the Annex (see also OECD, 2004g).

The performance in the Netherlands in the field of vocational training for ICT skills is illustrated in the following table. It shows the relative importance of computer training in total vocational training in 1999 (defined as training measures or activities which are fully or partly financed by the enterprise for employees with a work contract (CVTS2 2003, NewCronos). The underlying data are relative numbers (relative importance of computer training among other fields of training, by industry, by country) so it is not possible to compare absolute numbers of hours spent on each type of training, neither across industries nor across countries. Table 8 shows that, in relative terms, the importance of computer training in the Netherlands follows a similar pattern in the Netherlands to that for the EU15 as a whole, and that computer training is relatively more important in services sectors (except hotels and restaurants) than for manufacturing.

Another way of looking at ICT skills is by examining where they can be found in the economy. The 2004 *OECD Information Technology Outlook* has developed a new way of characterising industrial sectors by measuring their share of ICT-skilled employment, according to different levels of ICT skills: ICT specialists (e.g. software developers and programmers, those for whom ICTs constitute the whole of their job), but also basic and advanced users (counting those who use ICTs intensively in their job in order to produce their own output). The narrow measure includes only ICT specialists, whereas the broad measure includes both specialists and users. See OECD (2004d), and van Welsum and Vickery (2004) for more details. Looking at the average for the economy as a whole, 4.2% of total employment is classified in the narrow definition (compared to 3.1% for EU15), and 1 in 4 workers are considered as ICT-skilled and intensive ICT users according to the broad definition (25.3%, compared to 22.2% for EU15). The following figures show the distribution of ICT-skilled employment across sectors, according to the narrow and broad definition, respectively.

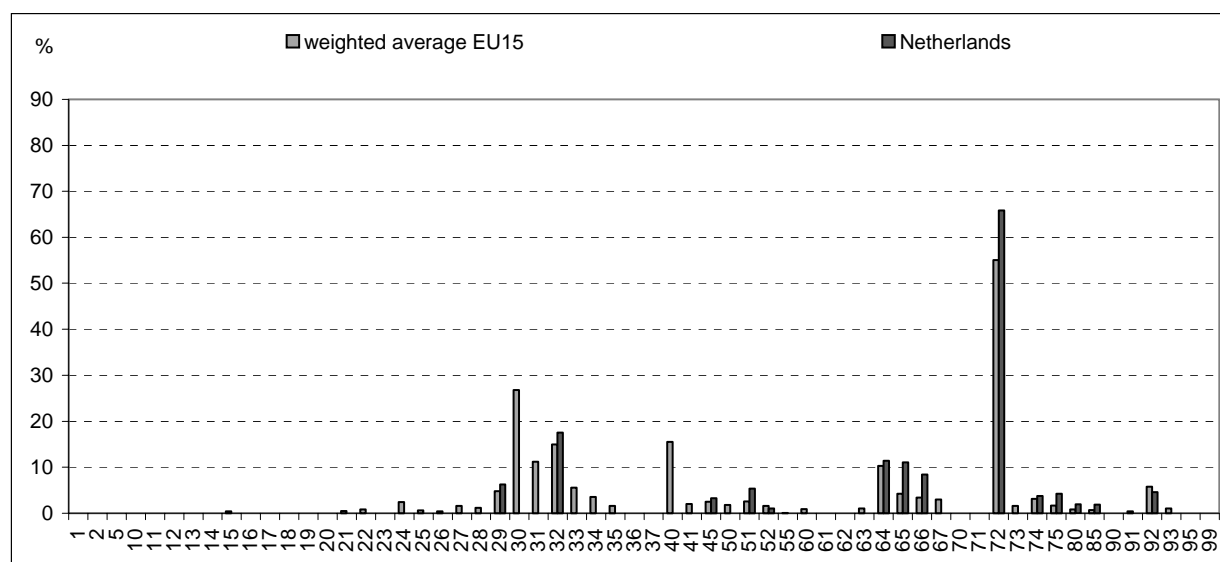
Table 8. Relative importance of computer training¹ in vocational training, selected countries, by industry², 1999

(Relative importance of computer training among other fields of training on the top row, and the most important field of training in the second row)

	D Manufacturing	E Electricity, gas and water supply	F Construction	G Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	H Hotels and restaurants	J Financial intermediation	K Real estate, renting and business activities	O Other community, social, personal service activities
EU15	2 EMF	1 (COMP)	1 (COMP)	4 SAM	3 PSWL	2 SAM	1 (COMP)	2 SERV
Finland	3 EMF	2 EMF	2 PSWL	2 SAM	1 (COMP)	2 SAM	1 (COMP)	2 PSWL
Italy	4 EMF	3 EMF	5 EPOHS	3 PSWL	3 EPOHS/SERV	4 SAM	1 (COMP)	6 PSWL
Netherlands	2 EMF	4 PSWL	4 EPOHS	3 SAM	6 SERV	2 AFN	1 (COMP)	2 EPOHS
Norway	2 EMF	1 (COMP)	3 EMF	2 SAM	5 SAM	2 SAM	1 (COMP)	1 (COMP)

Notes: 1. Fields of training: LGE = languages; SAM = Sales and marketing; AFN = Accounting and finance; MAD = Management (including human resource management and quality management) and administration; OFFW = Office work; PSWL = Personal skills/development, working life (including company knowledge and introduction courses); COMP = Computer science /computer use; EMF = Engineering and manufacturing (production techniques for goods and services including operations and maintenance of automated systems, quality control and development of new materials, products and services); EPOHS = Environment protection, occupational health and safety; SERV = Services (personal, transport, security; e.g. including hotel and restaurant, travel and tourism). The category 'OTHER = Other field of training' was excluded from the rankings.
2. Main NACE.

Source: OECD, based on Eurostat, Newcronos, CVTS2, 2003.

Figure 9. Share of ICT-skilled employment, according to the narrow definition, in total employment, by sector (2 digit NACE), 2002

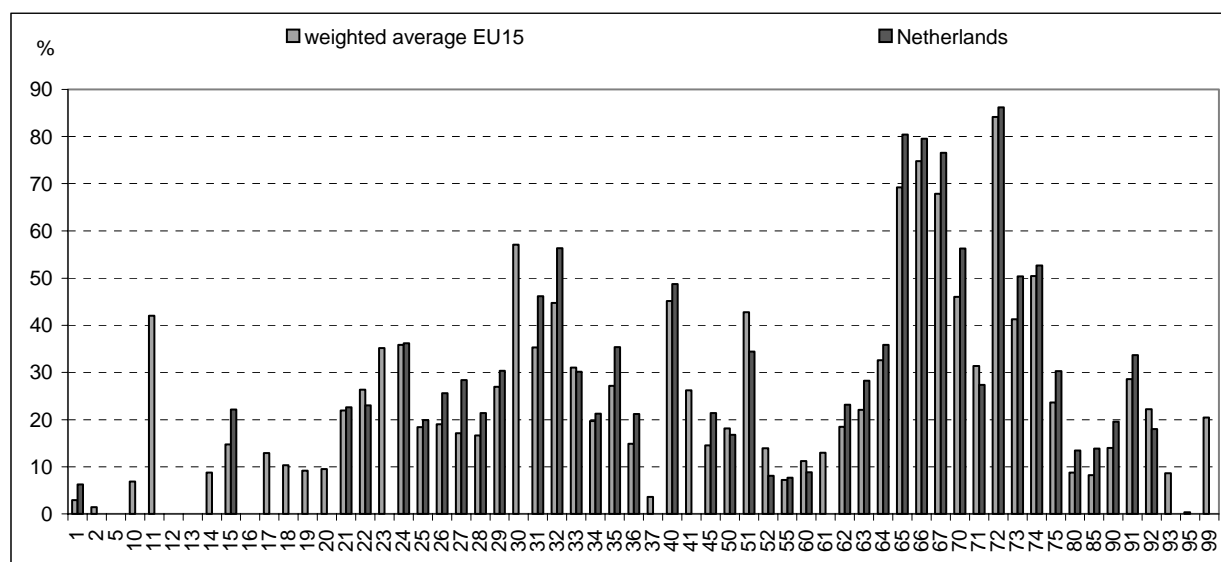
1. See chapter OECD (2004d, Chapter 6) for an explanation of the methodology. Only non-zero sectors have been included. Some sectors, where the data did not pass reliability thresholds, have been left out for the Netherlands.

Source: Authors' calculations, based on EULFS and methodology developed in OECD (2004d).

This narrow measure is equal to zero in many sectors, and for certain other sectors the number had to be suppressed because of reliability concerns. However, for those sectors where numbers are available both for the Netherlands and for the average of the EU15, it appears the share of ICT specialists employed in each sector is relatively higher in the Netherlands, mostly in sector 72 – computer and related activities,

and in the financial (intermediation) services sectors (65 and 66). Figure 10 shows the sector distribution of the share of ICT-skilled employment in total employment according to the broad definition, *i.e.* including ICT specialists as well as (intensive) basic and advanced users.

Figure 10. Share of ICT-skilled employment, according to the broad definition, in total employment, by sector (2 digit NACE), 2002



1. See OECD (2004d, Chapter 6) for an explanation of the methodology. Some sectors, where the data did not pass reliability thresholds, have been left out.

Source: Authors' calculations, based on EULFS and methodology developed in OECD (2004d).

Overall, the share of ICT-skilled employment in total employment appears to be somewhat higher in the Netherlands than the average of the EU15 as whole particularly for the financial services sectors, 65-67, as well as for some manufacturing sectors 31 and 32 (Manufacture of electrical machinery and apparatus and Manufacture of radio, television, and communication equipment and apparatus), except notably for the wholesale and retail trade sectors (51 and 52, respectively).

Summary

This section shows that the infrastructure in place in the Netherlands is well developed, also when compared to most OECD countries. However, those indicators that look at the use of ICTs show that performance can be improved. For example, the Netherlands performs below average on the two indicators of e-commerce (secure servers and the number of people using the Internet to buy goods and services). Furthermore, the Netherlands scores very low on science and engineering (and especially computer science) graduates, which poses a challenge for the future. The performance of the Netherlands in R&D and innovation indicators is also relatively poor, especially when looking at the services sector.

The position of the Netherlands in country 'e-rankings' also reflect that there is room for improvement. The Netherlands is ranked 8th in the Economist Intelligence Unit's (2004) e-readiness indicator (down from third position in 2003). The Netherlands also loses two places in the World economic Forum (2004) Networked Readiness Index³, from 11th place in 2003 to 13th place in 2004. Only in the International Data Corporation's Information Society Index did the performance of the Netherlands improve between 2001 and 2003, but it lost some places again in the 2004 ranking (6th place in 2004,

down from 3rd place in 2003, 6th place in 2002 and 10th place in 2001). This last index is essentially concerned with basic adoption, whereas the other two indices also look at the actual use of ICTs.

The next section will examine the policies that are in place in the Netherlands to increase the diffusion of ICTs to businesses, and those policies that address some of the shortcomings highlighted in this section.

Policies for the diffusion of ICT to business: General approach

In 1999, the Dutch government published its ICT Policy Agenda (*De Digitale Delta / The Digital Delta*), for a 3-5 year period. The new ICT policy agenda was published early 2004 (*De Rijksbrede ICT-Agenda – Beter presteren met ICTs / The National ICT Agenda – Performing better with ICTs*). However, the policy setting has changed somewhat between these two policy papers with a re-structuring of the organisation of the Ministries involved. In particular, the Dutch Directorate General for Telecommunications and Post has been transferred from the Ministry of Transport, Public Works and Water Management to the Ministry of Economic Affairs. This move was motivated by a concern to improve the structure and co-ordination for the policy settings and to strengthen ICT policies. The Ministry of Economic Affairs (Directorate General for Telecommunications and Post) is responsible for the overall co-ordination of ICT policies, but other ministries keep responsibility for certain specific policies (for example, the Ministry of the Interior and Kingdom Relations is responsible for the public sector information policy).

As the ICT Policy Agenda states, the ambition of the current government (Cabinet Balkenende II) is for the Netherlands to perform significantly better with ICTs and belong to the top-performing countries in Europe.⁴

However, the budget is tight⁵ and so funding should be allocated where it will achieve the highest returns and create the most benefits. This means, for example, a focus on certain areas in which the Netherlands can excel for the research and innovation policies, and on SMEs in the policies aimed at increasing the adoption of ICTs by businesses. There are also some new initiatives to reap the benefits of better use of ICTs in the public domain (health, education, security).

The starting point is formed by the objectives laid out in the Lisbon strategy and e-Europe2005, supplemented with specific objectives for the Netherlands. The overall objectives are *i*) to strengthen the ICT infrastructure and *ii*) to promote better use of ICTs. While it is generally acknowledged that the ICT infrastructure is among the better ones in OECD countries, the use of ICTs is lagging behind, especially within the government's own services (both at the level of central government as well as municipalities). The government (in its policy programme) acknowledges the urgency of developing the use of ICTs as part of a strategy to enhance productivity and economic growth.

Thus, to promote and improve the ICT infrastructure the 2004 ICT policy white paper proposes to:

- Maintain a high level infrastructure and create the conditions that will ensure lasting quality, access and trust.
- Create the conditions that will ensure a strong ICT-knowledge position and its intensive use, thereby also increasing the attractiveness of the Netherlands as a partner in international R&D projects and as a location for investment.
- Create the framework conditions for the successful application and use of ICTs (security, trust, legislation, regulations, standards, ICT-skills, etc.) in order to be able to exploit the opportunities offered by the information society.

In order to promote the better use of ICTs the paper proposes to:

- Promote the use of ICTs by businesses in order to increase productivity and efficiency.
- Promote public sector use of ICTs in its service provision to the public, businesses and institutions, and encourage other publicly funded sectors to do likewise. The aim is to improve quality and reduce costs, and reduce the gap relative to other countries.
- Ensure the active participation of citizens in the information society, increasing access to infrastructure and a variety of services.

Overall, the focus can be considered to fall on two broad areas: the first concentrating on the infrastructure as well as R&D and ICT research, and the second on what to do with this infrastructure and research. Particular attention will be paid to policies that will enhance productivity, especially in light of studies by the CPB (for example, van der Wiel and van Leeuwen, 2003) and the OECD (2004c, for example) that show that significant productivity gains can be achieved by the adoption of ICTs in businesses, especially when combined with innovative activity by ICT-using firms.

Policy co-ordination

The Ministry of Economic Affairs has the role of co-ordinating all ICT policies, but is not responsible for day-to-day management of the programmes. Thus, while the Ministry of Economic Affairs is responsible for co-ordinating policies, other ministries are in charge of the particular programmes that fall under their responsibility (*e.g.* the Ministry of Education, Culture and Science for policies relating to ICT skills, the integration of ICTs in education and e-learning, and the Ministry of the Interior and Kingdom Relations for public sector information policies and e-government). Close co-operation has been taken up in specific programmes and action plans as a result of the ICT agenda, and the CEDI (*Coördinatie Group Elektronische Dienstverlening* – Co-ordination Group for Electronic Services Delivery), which is also aimed at improving the consistency between various aspects of the use of ICTs in the public domain, has been put in place. The funding of projects through NAP (National Action Programme Electronic Highway – EUR 20 million per year) is increasingly being used as a co-ordination mechanism using a new set of criteria for the funding of ICT projects. The Ministries of Economic Affairs, of the Interior and Kingdom Relations, and of Education, Culture and Science are also working on the installation of an ICT panel (which will include non-governmental parties such as company representatives) to enhance coherence in ICT policies and keep a close track of progress being made.

There are several programmes that focus directly on stimulating the adoption of ICTs by businesses. These programmes are mainly the responsibility of the Ministry of Economic Affairs, but are carried out by external parties, in co-operation with the Ministry. Syntens carries out the ‘Netherlands goes Digital’ (NGD) programme which mainly focuses on SMEs that are technology followers. The ‘Competing with ICT Competencies’ (CIC) programme focuses on innovative firms in specific fields of application. ECP.nl (platform for e-Netherlands) is an organisation with essentially large companies and ministries as members. Its aim is to create the framework conditions for e-Netherlands by bringing together the expertise of all the relevant parties. These three initiatives work together on various projects and focus groups benefit from experience gained in the other focus groups. The publication from ECP.nl on the legal implications of doing business electronically can also be used for companies falling under the NGD and CIC programmes. Furthermore, the changes that take place in large firms may sometimes push the smaller firms to also adopt the technologies (value chain mechanism).

The policies and initiatives aimed at the early adopters of new technologies, or innovative firms, also benefit and overlap to some extent with the policies aimed at stimulating ICT research and development, in particular as one of the aims is to bring research institutes and universities together with businesses in order

to increase the relevance of the research and facilitate their application, while attempting to also increase the productivity gains that can be achieved.

Policies for the framework conditions for the diffusion of ICT to business

This section will examine the variety of policies that are currently in place in the Netherlands, each in their specific field. It discusses the policies that are instrumental to the policies that are directly aimed at increasing the uptake of ICTs by businesses, relating to infrastructure development, ICT research and development, innovation and its diffusion, and ICT skills, as well as those aimed at creating the framework conditions for increasing business use of ICTs, such as trust, security and privacy, for example. The policies aimed directly at increasing the use of ICTs by businesses are discussed in the next section.

Infrastructure development

The policy stance in the Netherlands is similar to that in other countries and in line with the rules and regulations of the European Union. Overall, the telecommunications and ICT market is very open and competitive in the Netherlands and there is an independent regulatory agency, the OPTA (*Onafhankelijke Post and Telecommunicatie Autoriteit*), that oversees the post and telecommunications market. Specific policies aimed at infrastructural competition between classical telecom operators and the cable companies (which have a very high penetration, 90%, in the Netherlands) has resulted in a robust infrastructure. A Dutch court has recently ruled that KPN is allowed to provide free broadband access to schools, as it was planning, and that this does not constitute an anti-competitive practice.

The current government acknowledges the importance of broadband, and rates the permanent innovation of networks and services development as very important (*de Breedbandnota* / the Broadband Policy Paper, Ministry of Economic Affairs, 2004). The government wants to emphasise the use of broadband in a way that should maximise its contribution to economic growth, but investment and much infrastructure development will be left to the market. The government aims to stimulate the development and application of services and other broadband applications both in the public and the private sector, as well as the development of a high-capacity network with substantial nation-wide coverage by 2010. As the government will not be directly involved in the infrastructure development itself, its policies will be technology-neutral and it will leave choices about technologies to the market. The government will handle its broadband policy within the framework of the new telecommunications law and the Open Network Provision regime. While it agrees that co-operation between market parties and various levels of government can be useful, it emphasises that any interventions creating a market distortion are to be avoided.

The ICT infrastructure in the Netherlands is well developed but will of course need continuous upgrading. In aid of this objective, as well as the drive to bridge the gap between research and business needs, many of the policies aimed at stimulating ICT research and development are geared towards maintaining and developing a high level ICT infrastructure. *Netwerken in Cijfers 2004*, published by the Ministry of Economic Affairs (2004c), contains a comprehensive overview of the post- and ICT-infrastructure and paints an overall picture of the market and its competition developments. Other initiatives, such as *Kenniswijk* (Knowledge City) also allow government and businesses to experiment with new applications and infrastructure, and it allows citizens to become more familiar with an integrated use of such an ICT infrastructure.

ICT research and development

To overcome the perceived weaknesses in R&D and innovation performance, the government is pursuing a policy aimed at 'bringing scientific results to life' through several initiatives that try to move the direction of research more onto practical applications (for example through the CIC programme, discussed in more detail below, which strives to put research institutes and universities in touch with industry). These efforts are combined with programmes such as 'Jacquard', aimed at boosting the efficiency of the use of ICT software (focussing in particular on software engineering and several applications of open source and open standards for software), and participation in international programmes such as ITEA and MEDEA (part of EUREKA).

Following a recommendation made by the ICT Forum in 2003, the government put in place a co-ordinating body for ICT-research and innovation ('*Regieorgaan ICT-Onderzoek en -Innovatie*') in the second half of 2004 in order to strengthen the ICT-research taking place and increase the overall coherence of research aimed at the application of ICTs. This body should also ensure that the research contributes to enhancing labour productivity.

As the 'Competing with ICT Competencies' (CIC) action plan mentions, the government is aware that the Netherlands is not performing as well as would be desirable in terms of innovation. The policies will be guided to focus on those areas in which the Netherlands can excel, such as informatics, multimedia, embedded systems, broadband and grid technologies (e.g. GigaPort⁶), and on bridging the gaps between the various public and private actors of innovation. Research in these areas will be facilitated and boosted by the Bsik (*Besluit Subsidies Investerings Kennisinfrastuur*) tender, under which a total amount of EUR 805 million will be available for projects in certain fields of technology, EUR 215 million of which go to ICT projects, on the condition that they involve co-operation between private and public research and applicants. Furthermore, in November 2003 the Minister of Education, Culture and Science (OCW) announced the Science Budget 2004 declaring the reinforcement of ICT research a national priority.

Innovation and diffusion

Increasing the number of early adopters will also be conducive to creating new and innovative goods and services. Over the past few years, the programme Competing with ICT Competencies (*CIC – Concurreren met ICT Competencies*) has focused on innovative firms through the creation of Next Generation Scenarios in specific fields of application as well as breakthrough projects (*doorbraak projecten*). In 2004, the CIC Diffusion Programme (*CIC uitstralingsprogramma*) was launched for the diffusion of the results to innovative SMEs. The main objectives of the CIC programme are *i*) to stimulate the development of strong ICT-clusters and *ii*) the development of know-how. The key players in this project are the Ministry of Economic Affairs, the Ministry of Education, Culture and Sciences, and the ICT Forum (which was founded by the ministries in 2002 and acts as an advisory committee on ICT research and on the interaction between industry and universities), in close relation with research institutes, universities and industry. One of the main objectives is also to stimulate the flow of knowledge from research institutes and universities to industry, and especially to industry ICT-users, not just to the ICT industry.

Stimulate the development of strong ICT clusters. One way is through the development of 'Next Generation Scenarios' in specific fields of application. These scenarios describe what can be expected to happen in these fields over the next 5 to 10 years, and what the implications are for the developments of ICTs. The second approach is through 'ICT-Breakthrough Projects', through which around EUR 38 million was attributed in subsidies over the period 2001-2003. The breakthrough projects consist of research institutes, universities and businesses coming together, at the invitation of the Ministry of Economic Affairs, to form a vision of the future in a particular field and to work out a project that will

allow the specified ambitions to be achieved. These projects were liable for subsidies. Examples of these breakthrough projects have been carried out in healthcare, financial services, wireless/broadband, and logistics.

Development of know-how. First, through the formation of ICT-consortia for Bsik (*Besluit Subsidies Investeren Kennisinfrastructuur*), which are subsidies for investments in joint public-private research, EUR 215 million of which go to ICT projects. Second, through several ICT-research programmes, such as GigaPort, which is a very advanced research network. It also allows the testing of new broadband applications, thereby stimulating the furthering of the broadband infrastructure and its applications among leading-edge customers. Third, through participation in EUREKA (ITEA, MEDEA+). And finally through ICT knowledge congresses, which are aimed at bringing all the relevant parties together and generating new co-operative projects.

A new 'Competing with ICT Competencies' policy document was published in 2004. The four main proposed approaches will be through: *i*) a high-level ICT research body, *ii*) the exploitation of research outcomes, *iii*) the diffusion of ICTs to SMEs (the CIC Diffusion Programme and the Netherlands goes Digital), and *iv*) raising the international ICT profile of the Netherlands (also in the context of the creation of the European Research Area).

While the Netherlands goes Digital focuses on SMEs that are considered to be technology followers across the economy, the **CIC Diffusion Programme** focuses on SMEs that are early adopters in specific fields of application. These advanced companies are identified with the help of the sector organisations. This programme is carried out jointly through Syntens, Media Plaza and SenterNovem (which is the Ministry of Economic Affairs' agency for granting subsidies), and in close partnership with sector organisations.

The CIC diffusion programme makes use of the **Next Generation Scenarios**, which it considers to be a strong tool for determining ICT strategies. However, not many companies are aware of them. The aim is to increase the number of early ICT adopters in the specific fields of application that were treated in the next generation scenarios. Thus, these scenarios are used as a 'vehicle', while the breakthrough projects are considered as 'showcases'.

The CIC Diffusion Programme relies on several axes of intervention: seminars (used for the diffusion of the Next Generation Scenarios, and attended by the more advanced SMEs as well as by business organisations), workshops (presenting Next Generation Scenarios to small groups of SMEs), and individual advice (on how to implement next Generation Scenarios' technologies).

The CIC is a relatively small programme, aimed at a small target group. It is a 4-year programme that will run from 2004 until the end of 2007. In total, some 2 500 – 3 000 companies are expected to attend one of the national or regional seminars and workshops organised. It is expected that individual advice will be delivered to 1 500 companies.

ICT Skills

Putting in place a competent skills base is becoming increasingly important, not only to ensure adequate resources for local activity, but also as a locational determinant of economic activity. As services become increasingly tradable as a result of rapid developments in ICTs, services production activities become increasingly location-independent, just like goods production. Having a pool of skilled labour is therefore crucial for the productivity and competitiveness of local companies, but is also important for ensuring future attractiveness and competitiveness of the Netherlands as a location for investment. It is important to ensure an adequate supply of ICT skills at various levels: basic and advanced users,

professional and technical ICT skills, as well as managerial and e-business skills. The latter are also especially important when introducing new technologies and e-business processes in companies.

The formal education system is likely to take care of the supply of basic ICT (user) skills, mainly through the integration of ICTs in schools and new e-learning methods. The policy paper of the Ministry of Education, Culture and Science, '*Leren met ICT*' (Learning with ICT) outlines the various ways in which it is planning to integrate ICTs in education, at the primary, secondary and tertiary level, but also in professional and adult education, vocational training, and in teacher training. It reflects the transition from 'learning to use ICTs', to 'using ICTs to learn', for which ICT skills are a pre-requisite. The policy paper also reviews the current situation in the various types of educational institutions, in terms of the infrastructure in place, the ICT competencies of teachers and their ability to use ICTs in the curricula, and identifies the main deficiencies and bottlenecks. Teachers' ability to integrate ICTs into tuition is one of the problems recognised.

The policy paper proposes to create the framework conditions for learning with ICTs, through adequate financing, infrastructure, competent teachers, content and software packages etc. However, it also aims to exploit the ways in which ICTs can be used to change educational policies themselves. For example, the government wants to use ICTs to combat teacher shortages, and is aiming to reduce early school drop-outs by making education more attractive through integrating ICTs. This is especially important as the percentage of drop-outs is relatively high in the Netherlands, well above that of the average for the EU15 and the OECD, and much higher than the United States, for example (OECD, 2004e).

The Ministry of Economic Affairs reports that in order to ensure the supply of professional and managerial ICT skills, labour market research has been carried out to identify needs and an action plan was subsequently drawn up. Three types of projects have received financial support from the government: *i*) those that aim to enhance the co-ordination between the education system and the labour market (at all levels of secondary and tertiary education), *ii*) those focussing on the market for post-initial education, and *iii*) those geared towards the employment in IT of specific groups in the labour force. Nine projects have received a total of EUR 33 million.

Leer Plaza: <http://www.leerplaza.nl>

Leer Plaza (Learning Plaza) was set up in May 2004 by TNO (see below) and constitutes the central portal for e-learning and blended learning courses. It is a joint initiative of TNO, the *School voor de Toekomst* (the School for the Future), *de Amerlandden Bedrijfsopleidingen*, and *ROC Midden Nederland*. Research was carried out by TNO to identify the main problems and obstacles of e-learning. The TNO study shows that the main impediments to the successful application of e-learning are: *i*) quality guarantee, *ii*) scale, *iii*) integration in companies' core processes, *iv*) standardisation, *v*) tailored projects and course adaptability, *vi*) interactivity, and *vii*) introducing e-learning means major investments. The aim of Learning Plaza is to support both businesses and educational institutions in the entire process of the introduction and use of e-learning.

Content creation

The position of the Dutch government is that the development of content is mainly market driven and commercial and, therefore, does not require any intervention on the part of the government. However, in some areas, where the government has a responsibility in ensuring the accessibility of a variety of both reliable and socially valuable information, it does support production and distribution. These areas include: public broadcasters, libraries and the national heritage sector (open up collections over the Internet and

stimulate and create new uses). Several cultural funds have also broadened their field to include content projects. Initiatives include:

Digitale Pioniers (2002-June 2005)

This temporary Digital Pioneers subsidy is aimed at small non-profit and civil on line initiatives intended to stimulate public debate and the formation of a public opinion. Digital Pioneers also helps these initiatives through the creation of innovative Internet services.

DISC (Domein voor Innovatieve Software en Content / Domain for Innovative Software and Content)

DISC is a joint initiative of the Waag Society en Nederland Kennisland (Netherlands Knowledge Nation). It focuses on organisations in the public domain that want to start using open software applications but do not know how. It provides information and analyses examples of ongoing projects on its Web site (<http://www.waag.org:8080/waagsite/bericht.shtml?270+2004+5947+NL>), as well as on the DISC Web site itself (<http://www.disc.nl/html/homepage.jsp>).

Kennisnet (<http://www.kennisnet.nl>)

This foundation was created for and funded by the educational field, and supported by the government. Its objective is to bring the supply and demand for educational content together.

Media Plaza

Media Plaza is a continuous demonstration unit with a high-tech centre in Utrecht as well as an on line portal. It was established in 1997, co-founded by the Ministry of Economic Affairs and several commercial parties. Today it is an independent demonstration centre financed on a project basis by its participants (ministries and commercial parties) and it is considering creating a Content and Knowledge Plaza. These would constitute platforms for relevant parties to exchange information and experiences.

Stimulating content: www.geheugenvannederland.nl ('memory of the Netherlands')

This Web site was developed by the Royal Dutch Library working towards the digitisation of the Dutch cultural heritage. The initiative received a one-off subsidy in 2000. The government wants to stimulate such initiatives and advocates, in particular, partnerships between media and cultural institutions and industry, creative content industries, and science and education institutions.

Digital Delivery

There are several specific policies related to digital delivery, focussing in particular on e-health and on the delivery of e-government services to businesses.

The use of ICTs in the health care sector: NICTIZ

In September 2000, a Declaration of Intent was signed by stakeholders whose conviction it was that the Dutch healthcare sector had to put in place and make operational as soon as possible a national ICT infrastructure, the prerequisite for an Electronic Patient Record (EPR). NICTIZ was founded in January 2002 with the support of the Ministry of Health, Welfare and Sport. It combines expertise of organisations such as those who had been in charge of the co-ordination of the standardisation of information in health, the ICT Platform in Healthcare, Virtual Integration of Care Information, and others. NICTIZ was granted a EUR 10 million subsidy by the Minister of Health in May 2002. The following September NICTIZ presented its plans and activities for the period up to the end of 2005. Its aim is to provide the framework

conditions for the nationwide provision of information for and about patients. It has chosen to focus on medical dossiers, which should be available in one region by 2004 and nationwide by 2006. Its activities can be divided into two programmes: AORTA and Link-up of Healthcare Applications.

AORTA is concerned with creating the basic infrastructure that allows the exchange of information between patients, care providers and health-care insurers in a secure and transparent manner. Key issues are identification, authentication, and authorisation. The second programme, **Link-up of Healthcare Applications** is aimed at providing a standardised information structure that allows practitioners in the health sector to exchange information. It involves developing information models, terminology systems and a structure for the Electronic Patient Record (EPR). It distinguishes between several areas of application: patient care, finances and administration, planning and logistics, knowledge and expertise, and policy and management.

Delivery of e-government services to businesses

The government launched an ambitious programme in 2003 aimed at increasing the use of ICTs in communicating with businesses (see also above), mainly to reduce the administrative burden on firms and to improve public service provision. The programme was developed in co-operation with employers and business associations such as VNO-NCW and MKB-Nederland. A distinction is made between developing the technical side, which should allow all government agencies to use the system and which falls under the responsibility of the Ministry of Economic Affairs, and the development of the services which is left to the various government agencies that will be offering them. The technical building blocks of the programme consist of (see also the public sector section below): *i*) a one-stop-shop for businesses, *i.e.* a single point of entry where businesses can access all information about the services provided by public agencies, *ii*) a government transaction gateway, aimed at facilitating transactions between businesses and government by providing authentication services and by distributing data among government agencies, and *iii*) a general business register containing the basic information on all companies and organisations, designated as a unique source of information, thereby removing the need to provide this basic information (name, address, owner) more than once. The budget for these building blocks amounts to EUR 20 million for four years (2003-2006), which does not include the budgets of the agencies responsible for designing the services provided.

Trust and security

Security initiatives

The Ministry of Economic Affairs and the Ministry of Internal Affairs have put forward several initiatives aimed at promoting security and trust online: *i*) de KWINT nota, *ii*) the Surf-op-Safe awareness campaign, *iii*) the Computer Emergency Response Team, *iv*) a National Warning Service for viruses and computer security related incidents, *v*) the National Telecommunications Contingency Plan, and *vi*) the Critical Infrastructure Protection, or Vistic-programme. Furthermore, the Netherlands organised a conference on e-security during its presidency of the EU in 2004. The conference concluded that e-security can substantially contribute to the Lisbon objectives and that in order to benefit fully from the information society, users need to be able to trust underlying structures and systems. Trust and security were also identified as part of the six most relevant policy topics in the field of ICTs during the Telecom Council of the European Union held under the Dutch presidency.

KWINT: *Kwetsbaarheid op Internet* (Vulnerability on the Internet) (<http://www.kwint.org>) is a public-private programme initiated by the Ministry of Economic Affairs. The Dutch government published its KWINT nota ('Vulnerability on the Internet' policy paper) in July 2001. This formed the basis for the KWINT programme which started on January 2002. Responsibility for the day-to-day running of the

programme lies with ECP.nl. KWINT shows entrepreneurs the dos and don'ts of doing business on the Internet. Its aim is to provide concrete solutions to Internet users (companies, consumers and government), for protection from risks inherent to Internet (business) activity. According to VNO-NCW this programme is starting to have some effect.

KWINT brings together experts on safety and security issues from the public and private sectors, such as telecom companies, ICT consultants, the police, ISPs, etc., who work with representatives of the target groups. Outputs include a step-by-step guide for SMEs on reporting cyber-crime, a practical guide for SMEs on how to secure their networks, an information leaflet explaining the risks and possible consequences of cybercrime to potential offenders (mainly aimed at teenagers), a scan of problem points in the Dutch Internet, and a document on potential co-operation models between computer emergency response teams. One of the current initiatives taking place under KWINT is a project group that will summarise all of the various security training certificates.

Surf op safe (<http://www.surfopsafe.nl>) is a general awareness campaign for the safer use of the Internet, aimed at SMEs and the general public. The project is a public-private partnership with a multitude of participants, but was initiated and is sponsored by the Dutch government. It provides practical information on the safe use of the Internet through its Web site, but also brochures, leaflets, guides for SMEs on safe e-commerce and the prevention of cybercrime, lectures and workshops, for example. The initiative will become part of the EU awareness project 'Safe Borders'.

The **Computer Emergency Response Team** for the government is called GOVCERT.NL (<http://www.govcert.nl>), an initiative of the Ministry of Home Affairs and Kingdom Relations, (officially) active since June 2002. It helps the government with preventing and dealing with issues such as computer viruses, hackers, and bugs in applications and hardware. It is also a member of FIRST, the Forum of Incident Response and Security Teams.

The **National Warning Service** for viruses and computer security related incidents (<http://waarschuwingsdienst.nl>) is run by GOVCERT.NL and has been operational since February 2003. It is aimed at SMEs as well as the general public and operates through a Web site and, depending on urgency, also through mobile phone text messages (since August 2003).

The **National telecommunications contingency plan**, NACOTEL, was established in 2001 in order to structure contingency policies and crisis management in the telecommunications sector. The Ministry of Economic Affairs (Directorate General of Telecommunications and Post) and the main fixed, mobile and data telecom operators have worked together on how to achieve NACOTEL's objectives.

Critical infrastructure protection: the Vistic programme is the telecommunications and ICT component of the Dutch government's Critical Infrastructure Protection programme which has been in existence since 2003. This is complemented by research carried out at the Ministry of Economic Affairs into measures aimed at relieving the effects of a possible discontinuation of telecommunications networks and services. This is of particular importance now that telecommunications are largely provided by private sector companies, potentially at risk of bankruptcy, which could imply a discontinuation of services and networks provided.

Privacy protection

There are several initiatives aimed at privacy protection: the implementation of the Directive 2002/58/EG (legislative), the Opt-in Code of Conduct (self regulation), the Opt-out Code of Conduct (self-regulation), and privacy enhancing technologies (PETs). The implementation of the general privacy Directive, early 2000, took a very long time and is still considered by some stakeholders in the Netherlands

to be over-restrictive compared to what has been implemented in other most other European countries, especially for transactions outside the EU.

Directive 2002/58/EG (Direction of the European Parliament and the Council) concerns the processing of personal data and the protection of privacy in the electronic communications sector. Until the incorporation of this Directive into national legislation (in May 2004) the legislation governing unsolicited commercial communications by e-mail and SMS was based on an opt-out regime. From May 2004 the regime for consumers (persons) is based on informed prior consent.

The **opt-in code of conduct** is an initiative from ECP.nl (platform for e-Netherlands) supported by the Ministry of Economic Affairs. ECP.nl has developed the 'Basic Principles for Commercial Email'. The aim is to register these basic principles with the Dutch Advertising Code Foundation (RCC: *Reclame Code Commissie*) as an official code of conduct. Some of the other participants are the Dutch Association of Internet Providers (NLIP), the Confederation of Dutch Industry and Employers (VNO-NCW), the Consumer Organisation (*Consumentenbond*), a platform regrouping initiatives to reduce spam (EMMA-NL), and the Branch Organisation for Home Shopping (<http://www.thuiswinkel.org>).

The **opt-out code of conduct**: the Association for the Self-regulation of Direct marketing (SZDM: *Stichting Zelfregulering Direct Marketing*) offers the possibility to unsubscribe from unsolicited commercial mail, telephone, e-mail and SMS through <http://www.infofilter.nl>, where the filter is based on the opt-out regime.

The use of **Privacy Enhancing Technologies** (PETs) is actively encouraged by the Dutch government. While most of these technologies have not yet reached maturation, pilots and studies to examine their effects are under way.

Other initiatives

The **PKI – Public Key Infrastructure** Task Force has been in place since 1999 in order to develop a PKI infrastructure. The aim is to guarantee the security and reliability of digital communications and transactions between the public sector, businesses and citizens using a PKI-enabled smart card. It aims to provide essentially three basic functions: *i*) electronic identification, *ii*) electronic signature, and *iii*) confidentiality. Some progress has been made in this project and includes the Dutch State Root certificate and the Program of Demands, which aims to standardise the way in which the Dutch government uses PKI. The generalised introduction of PKI takes place step-by-step, focussing initially on communication between government and business, and between government institutions. Other initiatives include those on electronic authentication and electronic identification means, such as smartcards, for electronic government services.

Security Plaza (part of Media Plaza) organises workshops and seminars where participants can exchange experiences and information. The Plaza also organises (virtual) communities to facilitate the exchange of information.

Finally, the information security dossier of ECP.nl (<http://www.informatiebeveiliging.nl/>) and relevant parts in *Nederland gaat Digitaal – Netjes volgens het boekje* (Netherlands goes Digital – Following the Rules) which sets out the rules governing the rights and obligations for firms conducting business on line. Two sections are of particular relevance here: electronic payments and information security and privacy.

Consumer protection

There are several (non-regulatory) initiatives in the Netherlands regarding consumer protection in the field of ICTs. These range from providing information, awareness campaigns, self-regulatory initiatives and codes of conduct, and public-private partnerships.

ECP.nl hosts the contact and information point on the implementation of the E-commerce directive (<http://www.e-commercerichtlijn.info>). ECP.nl's publication on the rules for e-commerce (see above), while directed at companies will also help to protect consumers as it explains companies' rights and obligations and helps them to better apply the rules. ECP.nl has also drawn up a Model Code (of Conduct) for Electronic Commerce, an initial version in 1999, which was updated in 2001. Unfortunately, no information is available regarding the extent to which the code is applied. The KWINT initiative (discussed above), is also hosted by ECP.nl and proposes solutions for the safe use of the Internet for consumers (and businesses and government).

A code of conduct for paid SMS services (self-regulation) was also signed on May 2003 at the initiative of organisations for the protection of consumers and the Dutch Regulatory Authority for the Telecommunications Market (OPTA). The branch organisation Thuiswinkel.org has also developed a code of conduct (self-regulation) on rules applicable to business-to-consumers relations. This was signed on June 2002. The rules refer to the relevant Dutch and European legislation, specific agreements with market parties (such as consumer protection organisations), binding general conditions and adequate dispute resolution.

The Web site <http://www.geschillenbeslechting.nl> also provides information on the possibilities of alternative dispute resolution (ADR), providing general information and contact points of ADR bodies. Finally, the Web site <http://www.staiksterk.nl> (Do I have a strong position?) provides consumers with information on their rights and obligations in business-to-consumer transactions, with a particular focus on online transactions.

Public sector use of ICTs

The Electronic Government Action Programme (*Elektronische Overheid: ELO*) was introduced late 1998, initially covering the period 1999-2002. The aim was to increase the efficiency and user-friendliness of public sector functioning through the use of ICTs. Public sector adoption of ICTs is also meant to set a good example, and to familiarise people and businesses with the use of ICTS and reduce the administrative burden (by 25% by 2006⁷). The aim is to provide 65% of public services over the Internet by 2007. There are several concrete initiatives.

1. An electronic register will be put in place which will contain information regarding the identity of all citizens, businesses and organisations. The information will have to be supplied only once and will subsequently be shared among government agencies.
2. The government has set up a Web site, www.overheid.nl, containing all information provided by public services (including administrative forms, and general information about the services provided). The aim is to add a search facility by 2007 which will cover all government documents and decisions.
3. The government has put in place an Intranet aimed at facilitating the interaction of civil-servants in different government institutions and in different parts of government.

4. The government will build a transaction gateway, using open standards and open source software, which should facilitate the transmission of information between government agencies and businesses (*programma Open Standaarden and Open Source Software, OSOSS*).

The government is also planning to use ICTs to reduce 'social bottlenecks', including initiatives for e-learning and e-health, but also using ICTs in resolving traffic problems and to facilitate payment systems, for example. The government will also experiment with using ICTs for remote e-voting. It has adopted the Experiments Act, the purpose of which is to experiment with location-independent voting for certain groups of voters during the June 2004 European Parliament elections.

Programma Andere Overheid (Programme A Different Government) aims to improve public service, in part through the integration of ICTs and modernisation of service provision. This is extended to lower government levels through the programmes 'Electronic Communes' and 'Electronic Provinces' (*programma Elektronische Gemeente, eGem, and Programma Elektronische Provincies, PEP*).

Other than their individual goals, these initiatives, should also serve to set an example for the use and integration of ICTs and help familiarise people and firms further with ICTs. Other initiatives include: PKI (discussed above), and local authorities 'super-pilots'.

The **local authorities super-pilots** (in Eindhoven-Helmond, Enschede, and The Hague) were aimed at increasing familiarity with ICTs by providing as many municipal services as possible electronically, and by integrating the Web sites of these municipalities with their back-office databases. These pilots were started in 2001 and the initiative's time-frame was recently extended by one year until late 2004. Other initiatives aimed at increasing public familiarity with integrating ICTs in day-to-day life include Kenniswijk / Knowledge City (see below). This initiative is also of particular importance since recent studies have shown the uptake of ICTs by the Dutch government, at all levels, to be relatively low compared to in other countries.

Policies aimed directly at stimulating the diffusion of ICT to business

Increasing the use of ICTs by SMEs

The main objective of policies directed at increasing firm use of ICTs is to increase productivity and competitiveness. It is expected that the potential for the largest gains lies with SMEs which, overall, have not yet integrated ICTs into their actual business processes, or at least not significantly. The Netherlands goes Digital (*Nederland gaat Digitaal*) is the main policy instrument, a follow up from the SPOED programme.⁸ Originally, the aim was that by the end of 2005, two-thirds of companies (SMEs) should have an Internet presence and conduct business transactions over the Internet, whether through their own Web site or not. In 2003 this goal had already been attained, possibly because these business transactions included tele-banking, so the target was changed to having 66% of SMEs using the Internet for buying and selling by 2005. However, there is no consensus on what would be appropriate indicators to measure the integration of ICTs into e-business. The Netherlands is also active in a European context, through the Go Digital programme, to improve the performance of e-business indicators.

The Netherlands goes Digital programme (NGD) is carried out by Syntens⁹, under the authority of the Ministry of Economic Affairs, and Syntens receives around EUR 5 million per year from the Ministry (EUR 20 million for the period 2002-2005). It focuses specifically on e-business and creating a dynamic business environment, and it aims to address what are considered to be the four main obstacles to the adoption of ICTs by SMEs: *i*) a lack of awareness regarding the possibilities that ICTS can offer in terms of changing business processes and conducting e-commerce, *ii*) a lack of both knowledge and experience in the field of ICTs applications, *iii*) a lack of trust in e-commerce and e-business, and *iv*) a lack of

resources and capacity for innovation. Furthermore, the focus is moving on from ‘how to use the Internet’, to a more advanced ‘integrating front and back office’. It has several axes of intervention: quick advice, individual advice, network advice, workshops (e-rooms), Digi-circles (*digikringen*) which include ‘Masterclasses’, a branch or sector programme (including 100 sectors) and pilot projects on subjects such as OSS, ASP, and marketplaces. For the years ahead, Syntens’ next challenge resides in getting companies to work together by promoting ‘Internetworked Enterprise’ through virtual organisation (from product development, to intermediate part suppliers, assemblers, transportation, warehousing distribution, service support etc.) aided by broadband connections¹⁰ (preferably 10Mbs).

Quick advice. An online application has been developed that asks companies to fill in a form on a particular topic, allowing a rapid self-assessment and ensuing advice (less than 10 minutes). This tool also allows the company to position its performance in a particular ICT area compared to other companies in the same sector and of similar size. The number of topics that can be treated in this way was increased from 12 to 20 in the first quarter of 2004. This tool is unique in the Netherlands. A broader self-assessment on e-business has also been made available online from 2004. This is the same tool as that used by Syntens advisors in the assessment that takes place prior to the individual advice (see below). Companies can request the assistance of a Syntens advisor for carrying out a digital quick advice.

Individual advice. The aim is to offer individual advice to 10 000 companies over the period 1999-2005.¹¹ By early 2004, 7 000 companies had already received such individual advice. These companies are chosen from a focus group of companies that are considered to be of interest from an ICT application and innovation perspective in order to maximise the impact of the interventions. The focus group consists of around 80 000 SMEs (out of a total of 560 000 SMEs). Individual advice consists of a two-day (up to 16 hour) visit by a Syntens advisor, who then puts the company in touch with a knowledge provider, which can be a commercial party but also a high school (upper secondary vocational) or TNO. The Ministry of Economic Affairs enables Syntens to pay for around 70% (for a maximum of five days) of this commercial advice. The initial visit by the Syntens advisor starts off with a scan of the company in question to examine and demonstrate how ICTs can work effectively for it. This ‘standardised’ scan looks at different aspect of conducting business: supply chain management, customer relations etc. After further examination of the company’s particular weaknesses and needs, the Syntens advisor will bring in the appropriate experts from commercial companies (for one, three or five days). As this commercial party intervention is targeted and based on Syntens advice, and also co-funded by Syntens, companies have greater trust and believe they will get value from their investment. Without the Syntens intervention, companies often do not know who to approach, as they often do not know their needs or capacity to innovate and integrate new business processes, and are less willing to invest as the outcome appears more uncertain.

Syntens also carries out an evaluation. Each company is asked to fill out a questionnaire before the individual advice visit takes place, and then again a year after the visit of the Syntens advisor. Syntens benchmarks each company. Evaluation criteria measure the percentage increase in Internet access, Internet presence, and in e-business in SMEs. This way, the impact of the Syntens intervention is monitored which is useful *i)* for the Ministry of economic Affairs as it accounts for the bulk of the Syntens budget, *ii)* for the company as it allows them to examine the value added and check its performance in the benchmark exercise, *iii)* for the Syntens advisor to use in future visits, and *iv)* for Syntens as whole to develop and strengthen its expert advice.

Network advice. From January 2004, regional Syntens offices have the possibility of offering network advice. Three types of networks are recognised: chains (a minimum of two companies that form part of a value chain), clusters (a minimum of two companies and at least one knowledge supplier who will develop a new way of doing business together electronically), and geographical groups (a minimum of three companies located together physically and who are developing together a way of doing business

electronically). A Syntens advisor can spend up to eight hours per company in the network to advise the network.

A network of E-rooms. Each of the 15 regional Syntens offices has an e-room, equipped with the latest high-tech communication applications such as a wireless LAN, smartboards and videoconferencing. Syntens has already organised some 3 000 tailor-made workshops and demonstrations (for specific target groups, *e.g.* in particular sectors) in these e-rooms. Among the advantages of these e-rooms is that they constitute a 'local' presence in all of the regions in the Netherlands. Moreover, they are available for all companies and deal with different levels of adoption of ICTs. Syntens also helps some 120 sectoral (business) organisations. The sector approach is carried out in co-operation with VNO-NCW (the Confederation of Dutch Industry and Employers) and MKB NL (the Employers Association SME Netherlands).

Digi-circles (*Digikringen*). This programme focuses on bringing ICT suppliers and SMEs together. The ICT supply industry often has a bad image with SMEs who find they do not speak the same language. Also, it is difficult for SMEs to get an (objective) overview of available ICT supply companies and SMEs often do not know exactly what they need or want from the ICT suppliers who, in turn, often do not have a good understanding about the needs of the client companies. Also, investments in ICTs tend to cost more than planned, and often SMEs end up with something that does not meet their expectations. Thus, the Digi-circles initiative aims to bridge the gap between SMEs on the one hand, and ICT supply companies on the other hand. The initiative has sprung out of several regional initiatives, but by 2002 it had become clear that a national programme was warranted. This national Digi-circles programme is carried out by Syntens under the authority of the Ministry of Economic Affairs. By early May 2004, there were 14 Digi-circles covering most regions, with a total of around 875 members (membership costs EUR 50 per company). These Digi-circles function through meetings (open regional meetings are held two to four times a year), the promotion of joint networks and '**Masterclasses**'. These Masterclasses propose a more intensive programme than the open meetings. Participation is restricted (a maximum of 15 companies per year per region) and costs EUR 100. The Digi-circles initiatives have been nominated as a 'best practice' initiative in Europe and have produced several spin-off initiatives (*e.g.* knowledge-circles). The Ministry of Economic Affairs, in co-operation with the organisations involved, is currently examining whether the Digi-circles can continue to exist as an independent network from mid-2005 onwards.

Pilot projects. One of the areas concerns **Open Source Software**. Branch organisations can come to Syntens for help in drawing up a plan, and will also receive up to 50% of the financing from Syntens. Syntens only intervenes on the branch organisation's side by giving strategic advice, and once a plan has been drawn up contact will be made with the relevant ICT supply side companies. Similarly, around EUR 1.5 million has been assigned to an **Application Service Provider** and **Marketplace** pilot. However, Syntens is only involved up to the moment of implementation. The actual implementation itself is left to the market.

Increasing the use of ICTs in larger firms

The ECP.nl – platform for e-Netherlands – is a private non-profit organisation, funded by the market (membership fees from companies which are both providers and users of ICTs) and supported by the government (for up to 50% of its budget). It raises additional funding from organising conferences and commissioned work (usually at the request of members). It has around 150 members, including companies, government ministries and business organisations. The corporate members tend to be large companies, such as ABN-AMRO, Ahold, Akzo, CapGemini, Cisco, Ernst&Young, IBM, KPN, Price Waterhouse Coopers, and Shell. Its aim is to help create the framework conditions for e-Netherlands (*i.e.* the integration of ICTs in all aspects of day-to-day life such as e-commerce and e-business but also e-learning, e-government, e-health etc.), by combining and bringing together the expertise of all the relevant parties. It

has a broad programme of work which is decided upon in consultation with its members by enquiring, every year or every other year, what members consider to be the main obstacles for using and benefiting fully from the opportunities offered by the information society. Thus, ECP.nl works on projects such as security (see below) legal frameworks, standards and interoperability, trust (see below), online dispute resolution, and authentication. It also organises conferences and workshops to discuss topical issues regarding e-business and the information society with its members.

Work on the implications of legal frameworks has led to the publication of *'Nederland gaat Digitaal – Netjes volgens het boekje'* (Netherlands goes Digital – Following the Rules). This is a very useful document that 'translates' the legal documents governing e-business and explains the actual implications (rights and obligations) for firms that conduct business electronically. Subjects treated include: setting up Internet selling points (domain names, contracts with ISPs), offering and selling products and services on line (information obligations on the Internet, closing deals over the Internet), regulation of electronic payments (payments over the Internet, taxation, *e.g.* VAT treatment, in the context of electronic business), information security and privacy (as well as digital signatures), dispute settlements (international private law: jurisdiction and applicable law, the admissibility of electronic proof in evidence, alternative dispute resolution/out-of-court settlements). The work on this project was funded by the Ministry of Economic Affairs through Syntens, which also uses it in its consultations with SMEs. ECP.nl is also carrying out work on the legal framework surrounding RFID.

ECP.nl also organises conferences, seminars and workshops, bringing all the relevant parties together and discussing topical issues regarding the integration of ICTs in businesses among all relevant parties.

Media Plaza

This independent ICT market place and demonstration centre in Utrecht is financed on a project basis by its participants, namely ministries and commercial parties. The Ministry of Economic Affairs uses Media Plaza, *inter alia*, for the CIC Diffusion Programme. Some 40 000-50 000 companies visit it every year (although it is mainly visited by the larger companies). It shows what e-business can do for your company. Media Plaza, together with its partners and sponsors, also organises events and seminars throughout the year. Examples in 2004 include the National ICT Event (May 2004), during which e-business and ICT-related awards are attributed, the National RFID Event (May 2004), a workshop on successful innovation in mobile service provision (in co-operation with CIC, May 2004), a seminar on changing customer relations (June 2004) and a seminar on e-HRM (September 2004). Media Plaza also operates through its online portal (<http://www.mediaplaza.nl/>) and there are also particular 'Plazas', such as the 'Security Plaza' which focuses on information security (see also above).

Other initiatives

Kamer van Koophandel Rotterdam (Chamber of Commerce of Rotterdam): Digital Port Rotterdam

Through its initiative 'Digital Port Rotterdam', which was opened on April 2004, the Chamber of Commerce of Rotterdam wants to contribute to the application of ICTs in SMEs (particularly in the trade, logistics, transport and industry sectors). It is an ICT centre where ideas and expertise can be exchanged in order to stimulate and advise SMEs on the use of ICTs in such a way as to enhance business processes and improve communication with clients, suppliers, and public authorities, which, in turn, should increase firms' competitiveness and innovative capacities. Digital Port Rotterdam co-operates closely with Media Plaza, sharing content and expertise.

Kenniswijk (<http://www.kenniswijk.nl>)

Kenniswijk, which started in 2000, is a public-private initiative – an experiment creating the ‘consumer market of the future’, covering 100 000 individuals from 45 000 households. These people are given a maximum of ICT-innovations and applications to examine whether they improve life, make it safer, more efficient, and more fun, and to test whether consumers are actually willing to use and embrace new technologies and change the way they carry out day-to-day tasks (online shopping, e-government, communicating and interacting with others, etc.). This initiative brings together many aspects of the policies discussed above through several channels: *i*) consumers, who get to test the latest applications and gain familiarity with using ICTs in day-to-day life, *ii*) businesses, which can use Kenniswijk as a platform to test out new applications and initiatives and use the results from this experiment in developing their strategies, *iii*) government, which can experiment with interacting with its citizens through ICTs and identify successful and problematic areas, and *iv*) research activities, which can be tested and developed further according to the ‘preliminary’ findings.

Platform HPCN

Platform HPCN fosters and supports the introduction of new information and communication technology in the Netherlands by acting as an intermediary between suppliers and users of ICTs in the Netherlands. The platform relies on the knowledge and expertise of more than 70 members, among which research institutes, universities, software and hardware companies, as well as a number of firms that are users of ICTs. Its aim is to contribute to the diffusion of ICTs and innovation in the Netherlands in order to increase competitiveness and productivity growth. The Platform is also involved in initiating and developing new projects related to innovative ICT. Its publication ‘*Nederland Digitaal – ICT-Innovatie in een Kennisintensieve Netwerksamenleving* (ICT innovation in a knowledge-intensive network society) provides a comprehensive overview of its activities and a list of all of its members.

TNO projects

TNO, a large Dutch research and technology organisation, and in particular the branch that focuses on Strategy, Technology and Policy (TNO-STB), is involved in many ICT-related projects, such as the Electronic-commerce Business Impacts Project — EBIP (in co-operation with the OECD) and *Leerplaza* (see above). Its mission is to make scientific knowledge applicable to strengthen the innovative capacity of business and government. Among its core areas are ‘ICT policy studies’ and ‘ICT and services’. Some of TNO’s output is directly related to the diffusion of ICTs to business, for example with research on the possibilities and applications of innovative ICT applications in various domains and sectors, including analyses of new operating models and shifts within value chains. It also works on topics that relate more to infrastructure development, such as research on high-grade electronic networks.

Budgets and costs

There is no comprehensive overview of the costs attached to the various initiatives and policies, or of the budgets available for them. Where information is available it is not necessarily consistent between different sources. One explanation is that as ICTs are becoming more and more pervasive in the economy, separate ICT-budgets are no longer necessary as the ICT initiatives become integrated within wider policy schemes and budgets. The Netherlands does have a budget available (EUR 20 million per year) in the national action programme electronic highway (NAP) for co-ordinated ICT projects involving various departments in general, but the proportion of this funding that goes to projects aimed directly at the diffusion of ICT to business is not known.

Policy evaluation

From 2004, the Ministry of Economic Affairs has been actively involved in the consistent and comprehensive evaluation of its policies in all areas, including those in ICTs. All instruments including those related to ICT will be evaluated in 2005 on economic legitimacy for government action (*e.g.* are there market failures) and economic effectiveness. Over the past few years the Netherlands has also put in place a systematic policy evaluation process (*Van Beleidsbegroting Tot Beleidsverantwoording* (VBTB) – from policy budget to policy justification) and objectives for policy making need to be formulated as concretely as possible in terms of outcomes. Once a year the Ministry of Economic Affairs reports to parliament by answering the following questions: *i)* were the objectives achieved, *ii)* were the announced measures carried out, and *iii)* was the budget spent as planned? This forms the basis for attributing resources to new policies and it increases the level of transparency and efficiency of policy initiatives.

Separate policy specific evaluation is also undertaken. For example, in the field of e-business, in 2002 the Ministry commissioned Bureau Bartels BV (a research and management consultancy firm) to carry out an interim evaluation of the NGD programme run by Syntens. This evaluation was conducted on the basis of interviews with participants in the various NGD initiatives, such as workshops, the individual advice sessions and the branch programmes, as well as Syntens staff and representatives of branch organisations. The report found the running of the NGD programme to be satisfactory overall, while it also made some specific recommendations to be implemented and incorporated over the course of 2003. A subsequent evaluation is planned for 2006.

Syntens has its own evaluation of interventions carried out. Companies are asked to fill in a questionnaire before the intervention (stage 0), and then once again one year afterwards (stage 1). They are asked to answer several questions that will measure whether their use of ICTs, at various levels of usage, has increased since the intervention of a Syntens advisor. Currently, some 1 500 companies are in the database at the stage 0 assessment. This database is soon to be updated to include results from the stage 1 evaluation. While this evaluation carried out by Syntens is an impact study rather than a policy evaluation, it provides useful information to be included in a policy evaluation. Furthermore, Bureau Bartels has found the internal Syntens evaluation to be a reliable measurement of ‘customer satisfaction’.

Conclusions

General remarks

It has generally been recognised that the Netherlands is not performing as well as would be desired on the innovation front, and its productivity growth has been lagging. In this context, the government focuses on stimulating R&D and innovation in ICTs as well as increasing the links between those carrying out research and businesses so that new applications can be adopted more easily and will focus on the most productive uses. The other main policy area for the government is increasing the use of ICTs, and in particular increasing the diffusion of ICTs to SMEs as it believes this is where the largest efficiency and productivity gains can be achieved. However, high-tech entrepreneurship in the Netherlands is not well developed (OECD, 2004b), limiting diffusion of new technologies and research through new firms. These issues represent some major policy challenges for the Dutch government.

The government’s policy papers show that it is planning to minimise interventions in many areas and leave much up to the market and no additional funding seems to have been made available for ICT policies. This makes it sometimes unclear how it is planning to achieve the objectives set out in the various policy papers. In the case of broadband infrastructure where the government remains technology-neutral and does not plan to make any substantial investments, it works on consistency and co-ordination. It leaves the choice of technology and the investments to be made up to the market. The government states that the

aim is to stimulate the development of a high-capacity network with substantial nation-wide coverage by 2010, but it is not clear how it will ensure that this will be the outcome.

Furthermore, it seems that where goals are set in the field of e-business, they tend to be quite low, and in some cases so low that they have been revised upwards during the policy span. For example, in the Netherlands goes Digital the objective was for two-thirds of SMEs to conduct transactions over the Internet by the end of 2005. This was subsequently revised to two-thirds of SMEs using the Internet for buying and/or selling, a somewhat more difficult target than the original one since the specification of transactions included online banking. However, this is still a rather weak target, especially since the qualification is to buy or sell over the Internet, rather than the more ambitious integration of ICTs into business processes. However, in the summer of 2004, sector-organisations, government, universities and Syntens came together to formulate more e-business oriented goals for the “Netherlands goes Digital” project. It has been agreed that from 2005 Syntens will stop advising on general Internet usage issues and will start to focus on more e-business type themes such as electronic market places, broadband and value chain integration. The specifics of the 2005 plan are currently being worked out together with the Ministry of Economic Affairs.

Finally, the Netherlands has recently put in place various instruments to enhance policy evaluation, such as the VBTB (from policy budget to policy justification). However, concerning the more specific policies aiming at the diffusion of ICT to business, or their impacts, it is not necessarily clear what would be appropriate indicators to measure, for example, the integration of ICTs into business processes and their effectiveness. The absence of any generally agreed measures makes it hard to evaluate the success of these policies. Two publications (*Netwerken in Cijfers* and *De Digitale Economie*) monitor developments in the ICT infrastructure and the evolution of the digital economy.

Strengths

The Netherlands has a good ICT infrastructure. It has a consistent market-led policy stance, and a cautious budget policy. Ideally this would provide a stable framework for more focused ICT policies. The high priority given to ICT R&D and innovation and to the diffusion of ICTs to businesses, and SMEs in particular, suggests that the Netherlands is aiming to create a strong position for the future. Furthermore, attention is also being paid to creating the framework conditions that will allow an increase in the diffusion of ICTs to businesses, such as trust, security and privacy. Important features of ICT policies that will help diffuse ICTs to business include:

- Awareness that the ICT infrastructure will need continuous upgrading and advocating policies that stimulate the development of new technologies.
- Open and well functioning telecommunications markets.
- The government uses initiatives that combine input and/or co-ordination from the government with private institutions (*e.g.* the Netherlands goes Digital programme and the co-operation with ECP.nl).
- Many of the initiatives bring all of the relevant parties together, which allows them to assess each others’ needs and problems and exchange information and experiences (*e.g.* the conferences and workshops organised by ECP.nl).
- The Netherlands goes Digital appears to be a very good initiative as it visits companies directly and helps them identify their ICT needs and the best ways of satisfying them. The programme appears to be well run by Syntens, in co-operation with the Ministry of Economic Affairs.
- The events organised by ECP.nl, as well as their research and publications seem very useful and helpful initiatives. In particular, the publication explaining all the legal texts related to conducting

business electronically is a very useful aid for firms. The very dynamic ECP.nl team has many fresh and innovative ideas and works on the most topical issues.

- The government is aware of some of the weaknesses in the Netherlands (*e.g.* on innovation) and seems determined to tackle those issues.

Weaknesses

Specific policies to diffuse ICTs to business are constrained within the general market-led approach to policy in a very tight budgetary framework. Some of the weaknesses below are common to other OECD countries and the Netherlands could draw upon their experiences. Specific points include:

- The performance of the Netherlands in terms of R&D and innovation is relatively weak.
- The Netherlands is producing comparatively few science and engineering graduates which may jeopardise future ICT research, application and diffusion. The policies aimed at ensuring ICT skills do not seem particularly prominent.
- Full, clear, formal and transparent ICT policy co-ordination has been addressed only recently and is now in the process of being implemented.
- The various policy papers focussing on the diffusion of ICT to business, such as the NGD, describe many objectives but without making it clear how they will be achieved, especially without additional funding to reach out more broadly.
- The government leaves much up to the market. While this can be a strength, there are no obvious contingency plans in place in case the market fails.
- Clear and consistent evaluation of policies has recently been implemented but needs to be continued. The evaluation process is complicated further by the difficulty of establishing clear measures of ICT business impacts.

Recommendations

The Netherlands should extend and build upon its strong areas to strengthen its outlook. The recommendations that follow identify priority actions that should assist the Netherlands in increasing the benefits they derive from current policies, as well as areas that need to be developed in order to raise their effectiveness and impact:

- Raising productivity growth remains a major challenge, and the diffusion of ICTs throughout the economy can make a valuable contribution.
- There is a need to continue and implement new initiatives for formal and transparent ICT policy co-ordination. Budget allowing, the scale and scope of some of the programmes and initiatives, especially those that involve direct interventions in companies and those that bring relevant parties for various issues together, ought to be extended.
- The government should reaffirm its commitment to achieving some of its policy objectives and make clear how it is aiming to achieve them.
- The government should aim to strengthen (ICT) entrepreneurship and improve human capital, especially in the field of science and engineering. Attention to ICT skills, at various levels, should be increased.
- Research and innovation in ICTs should be fostered and the government should continue its efforts to bring research and industry together.

- Diffusion programmes such as the one conducted by Syntens aimed directly at increasing the diffusion of ICTs to SMEs should be continued and adjustments to the focus can be made in light of ongoing evaluations of needs.
- There is a need to continue current initiatives for transparent, continuous and systematic evaluation. The outcome and recommendations of which should feed back into ongoing policies (as was done with the evaluation of the Netherlands goes Digital programme) and inform future initiatives.

NOTES

1. In comparison, Finland counts 15 inhabitants per square kilometre, Norway 14, Switzerland 177, Italy 192, and Republic of Korea 491.
2. In 2003, Norway's GDP/capita was USD 31 800, in Switzerland it was USD 31 700, Finland USD 26 200, Italy USD 25 000, and Republic of Korea USD 19 400.
3. This index contains three components of equal weight: the environment index (where the Netherlands are ranked 15th), the readiness components (Netherlands ranked 14th) and the usage component (Netherlands ranked 12th). These indices, in turn, are also broken down into components. Thus, the environment index is composed of the market environment index (Netherlands ranked 12th), the political and regulatory environment index (Netherlands ranked 14th), and the infrastructure environment (Netherlands ranked 20th). The readiness index includes the individual readiness index (Netherlands ranked 12th), the business readiness index (Netherlands ranked 15th) and the government readiness index (Netherlands ranked 19th). Finally, the usage index's components are the individual usage index (Netherlands ranked 3rd), the business usage index (Netherlands ranked 15th), and the government usage index (Netherlands ranked 40th).
4. Letter from the Prime-Minister dated 13 September 2003 (Kamerstukken II, 29 202, nrs. 1-2).
5. The fiscal balance of the Netherlands has deteriorated significantly in recent years, reaching 3.2% of GDP in 2003, *i.e.* breaching the 3% limit imposed by the Maastricht Treaty.
6. This initiative is to be extended as the GigaPort Next Generation Network, which combines the 50 universities, research institutions, academic hospitals, companies and related institutions that have committed themselves to jointly research, design, build, operate and use the research network until 2007. The project has been granted a EUR 40 million subsidy.
7. This also forms part of the programme 'A different government' (*Programma 'Andere Overheid'* which aims to achieve a different type of government where the involvement of the State is reduced, less rules and regulations, and citizens are given more responsibility and freedom in the way life in society needs to be organised. This is supplemented by the programme 'ICT and administrative burden' (*programma ICT en Administratieve Lasten*), aimed at reducing the administrative burden on firms through the use of ICTs.
8. SPOED stands for '*Stimulerings Programma Opkomst Elektronische Diensten*' (Programme for the Stimulation of Electronic Services). This programme was developed around 10 years ago, under the responsibility of the Ministry of Economic Affairs. It provided a point of information for entrepreneurs who wanted to get involved in e-business. Around 1997/1998 it became clear that a single point of information on e-business was no longer sufficient and that more 'tailormade' advice for entrepreneurs was needed. Syntens then took over the information point from the Ministry of Economic Affairs and added tailormade advice to it. The SPOED programme was abandoned in 2001 when a new programme, '*Nederland gaat digitaal*' was launched.
9. Syntens is funded mainly by the Ministry of Economic Affairs.
10. As broadband infrastructure is used for this part of the programme, checks are under way to see whether it can be financed from the 'Broadband Action Programme' also from the Ministry of Economic Affairs.
11. This number was revised downwards when the option of network advice was introduced at the beginning of 2004.

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APPENDIX: LIST OF PERSONS INTERVIEWED DURING THE OECD MISSION

The Hague, 22-23 March 2004

Ministry of Economic Affairs

- Simone Meijer, Senior International Policy Advisor.
- Fred Couzy, Senior Policy Advisor.
- Robin van IJperen, Senior Policy Officer.
- Najat Aoulad el Kadi, Advisor Innovative Entrepreneurship.
- Peter Koudstaal, Syntens, Advisor and 'The Netherlands Goes Digital' Project Manager.

CPB

- Henry van der Wiel.

CBS

- Sjaak Pronk, Head Science and Technology Statistics.
- Lydia Geitenbeek.

ECP.nl

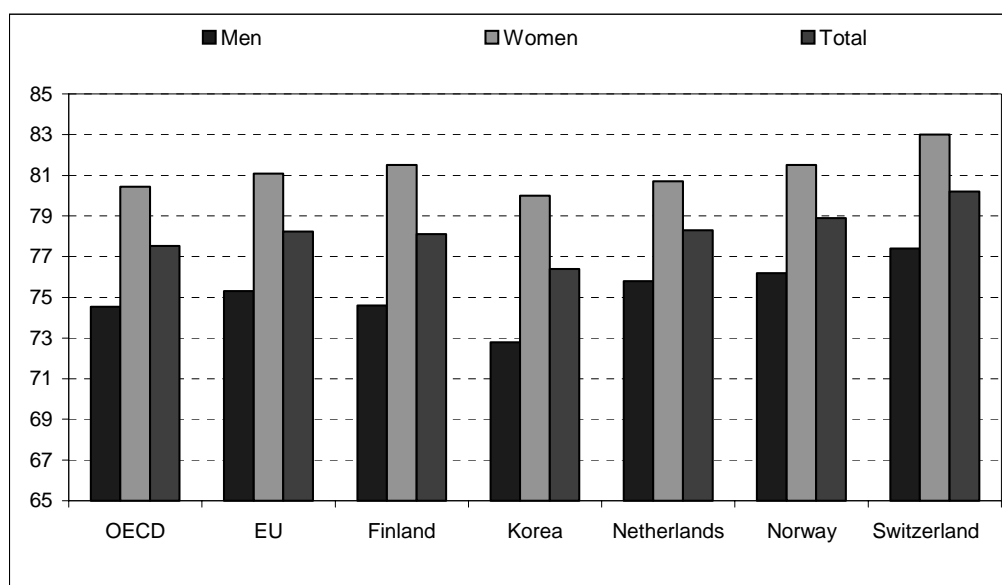
- Arie van Bellen, Director.
- Ton Wagemans, Advisor.
- Bart Schermer, Advisor.
- Rena Warmerdam, Researcher.
- Ralph van den Hoek, Researcher.

VNO-NCW

- Paul de Graaf, Secretary Information Policy.

ANNEX

Figure A.1. Life expectancy at birth, selected countries, 2001



Source: OECD Health Data 2004, 3rd edition.

Table A.1. Share of value added in total gross value added¹, current prices, 2000

Percentages

	Aggregate sectors (ISIC Rev. 3)								
	Agriculture, hunting, forestry and fishing	Mining and quarrying	Total manufacturing	Electricity, gas and water	Construction	Wholesale and retail trade; hotels and restaurants	Transport, storage and communication	Finance, insurance, real estate and business services	Community, social and personal services
	01-05	10-14	15-37	40-41	45	50-55	60-64	65-74	75-99
United States	1.6	1.3	15.8	1.9	4.9	16.0	6.7	29.4	22.5
Japan ²	1.4	0.1	19.5	3.5	7.3	12.8	6.0	26.9	22.5
Netherlands	2.7	2.6	16.3	1.5	5.7	15.2	7.1	26.4	22.5
European Union	2.2	0.9	19.5	2.0	5.4	14.8	7.0	26.8	21.4
Total OECD	2.3	1.2	18.3	2.3	5.6	15.3	7.0	26.7	21.3

Note: 1. Value added measured at basic prices except for Japan and United States – measured at factor costs.
2. For Japan, Hotels and restaurants (ISIC 55) are included in Community, social and personal services (ISIC 75-99).

Source: OECD Science, Technology and Industry Scoreboard 2003.

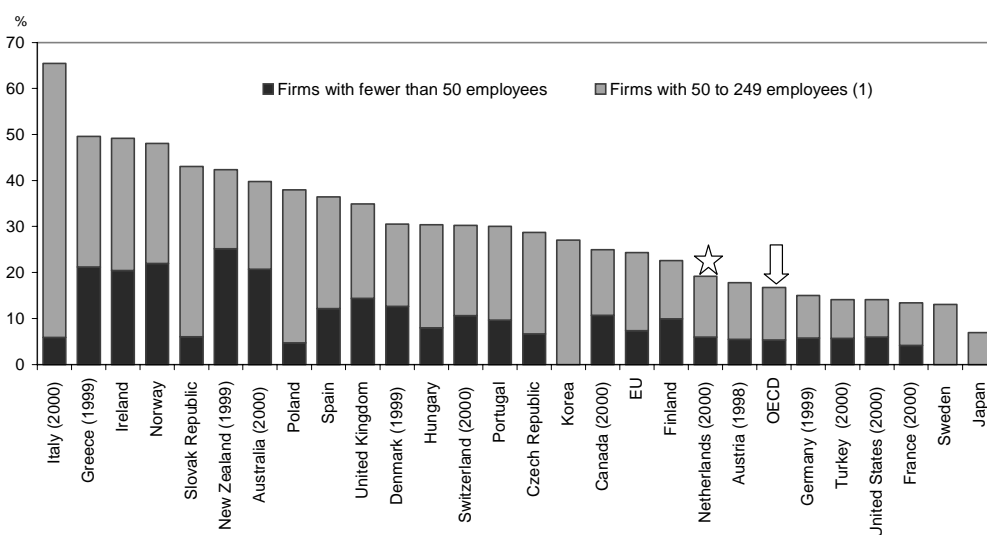
Table A.2. Business use of ICTs

	Enterprises using computers				Enterprises with Internet access			
	1995	1998	2001	2003(1)	1995	1998	2001	2003(1)
<i>by sector</i>								
Agriculture, hunting and forestry	72	83	87	87	4	27	72	73
Mining and quarrying	..	78	96	92	..	34	84	88
Manufacturing	85	91	92	92	10	52	82	85
Electricity, gas and water supply	94	74	81	83	38	66	82	86
Construction	81	85	92	93	4	27	70	78
Trade and repair of goods, hotels and restaurants	71	79	92	91	7	38	77	80
Transport, storage and communication	73	80	91	90	10	38	76	82
Business services	82	86	92	92	21	57	85	88
Other services	82	88	93	94	16	37	77	85
Total	78	84	92	92	11	42	78	83
<i>by size</i>								
5 to 10 employees	67	77	89	89	6	32	71	76
10 to 20 employees	82	87	91	92	10	40	78	83
20 to 50 employees	88	91	96	96	13	50	89	91
50 to 100 employees	93	92	96	96	17	59	88	92
100 to 200 employees	94	93	97	97	26	67	92	95
200 to 500 employees	94	93	97	97	32	72	95	97
500 and more employees	95	93	97	98	50	80	93	97
Total	78	84	92	92	11	42	78	83

Note: 1. Forecast from the businesses in 2001-2003 Automatiseringsenquête Survey.

Source: CBS (2003).

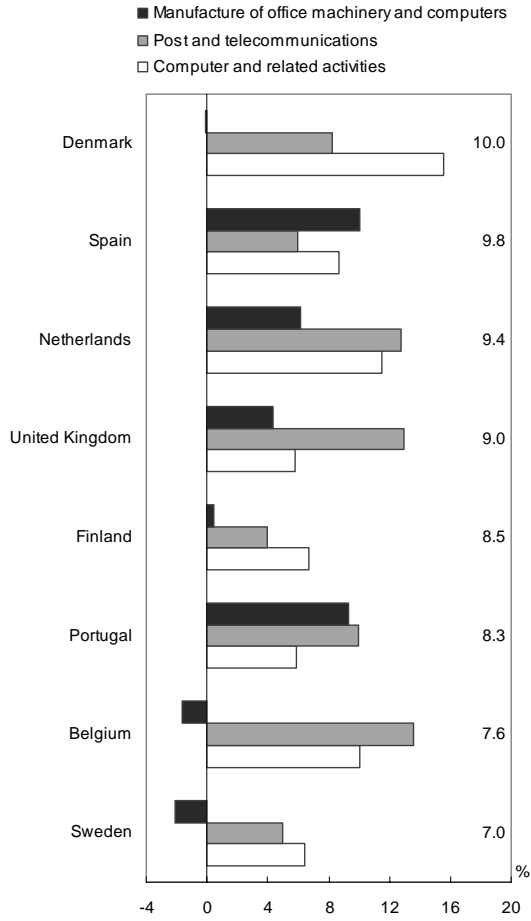
Figure A.2. Share of SMEs in business sector R&D, 2001 or latest available year



Note: 1. For the Netherlands and Norway, 50 to 199 employees instead of 50 to 249 employees. For New Zealand, 50 to 99 employees instead of 50 to 249 employees. For Japan and Korea, fewer than 299 employees.

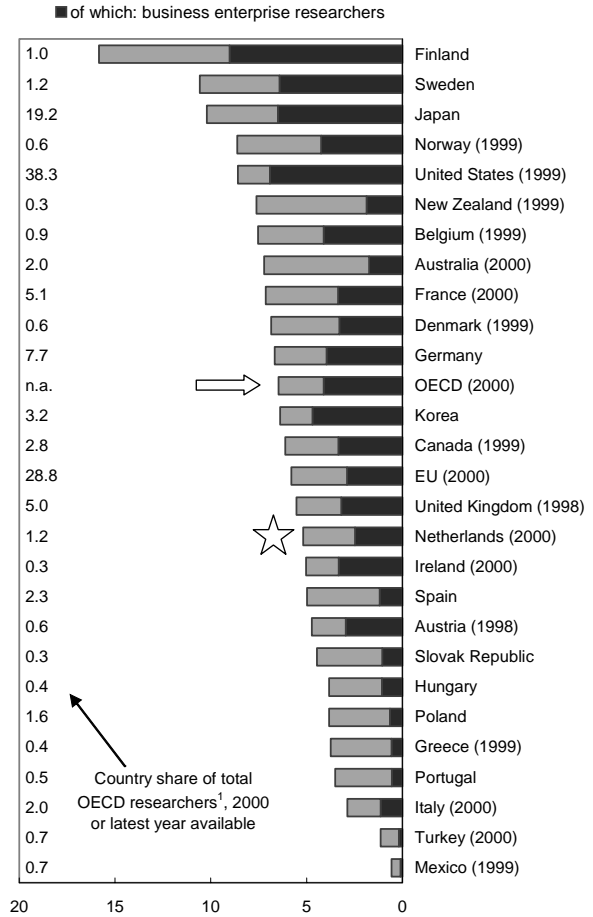
Source: OECD Science, Technology and Industry Scoreboard 2003.

Figure A.3. Net firm entry in ICT industries, difference in entry rates compared with entry rates for the total non-agricultural business sector



Source: OECD Science, Technology and Industry Scoreboard 2003.

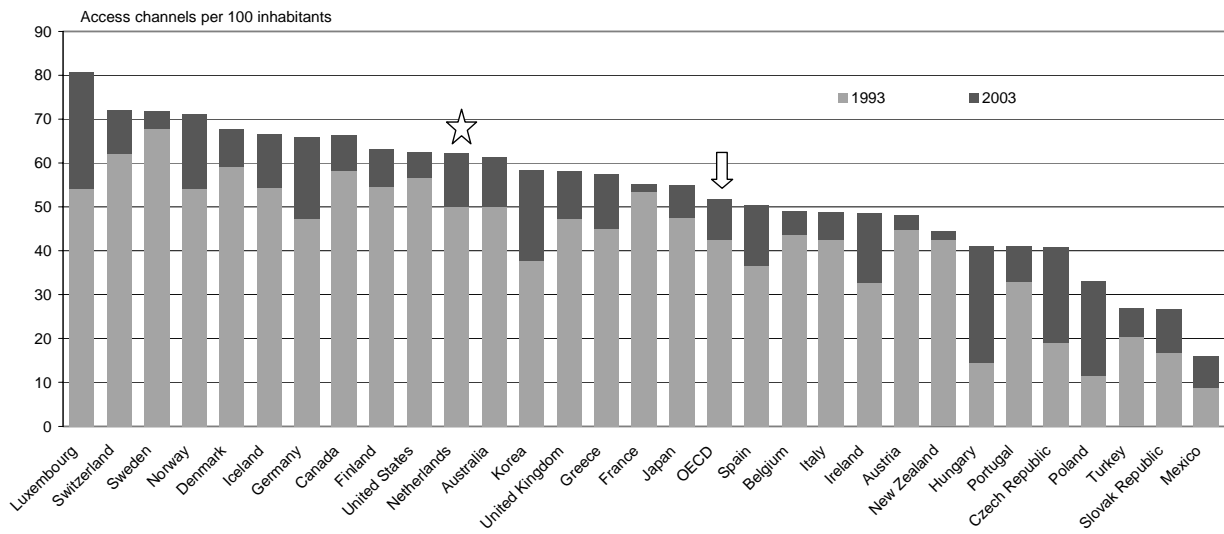
Figure A.4. Researchers per thousand total employment, 2001



Note: 1. Country share relates to latest available data. For example, the country share for Italy is calculated as the number of researchers in Italy in 1999 as a percentage of total OECD researchers in 1999.

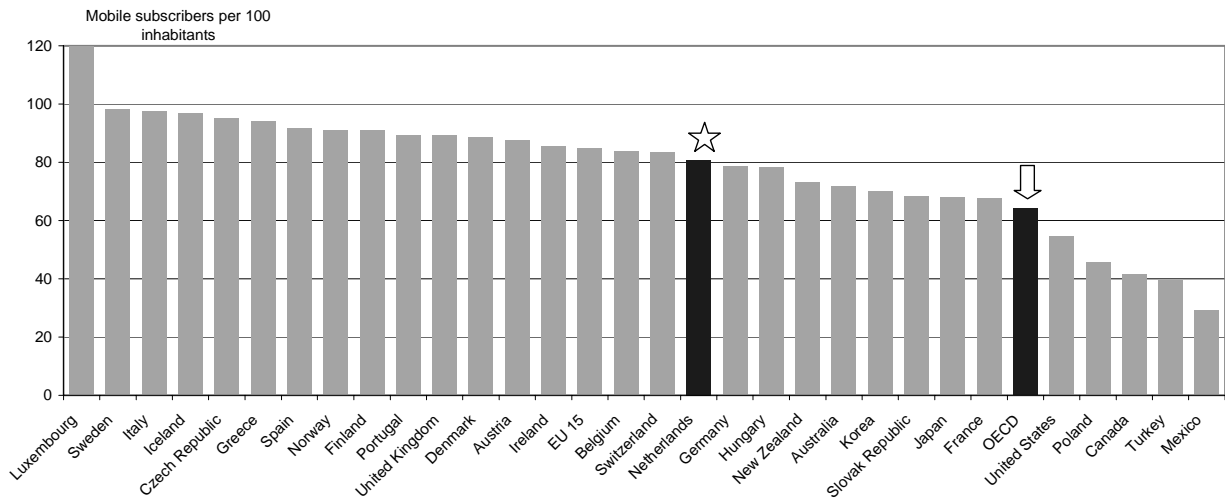
Source: OECD Science, Technology and Industry Scoreboard 2003.

Figure A.5. Telecommunications channels per 100 inhabitants, OECD countries, 1993 and 2003



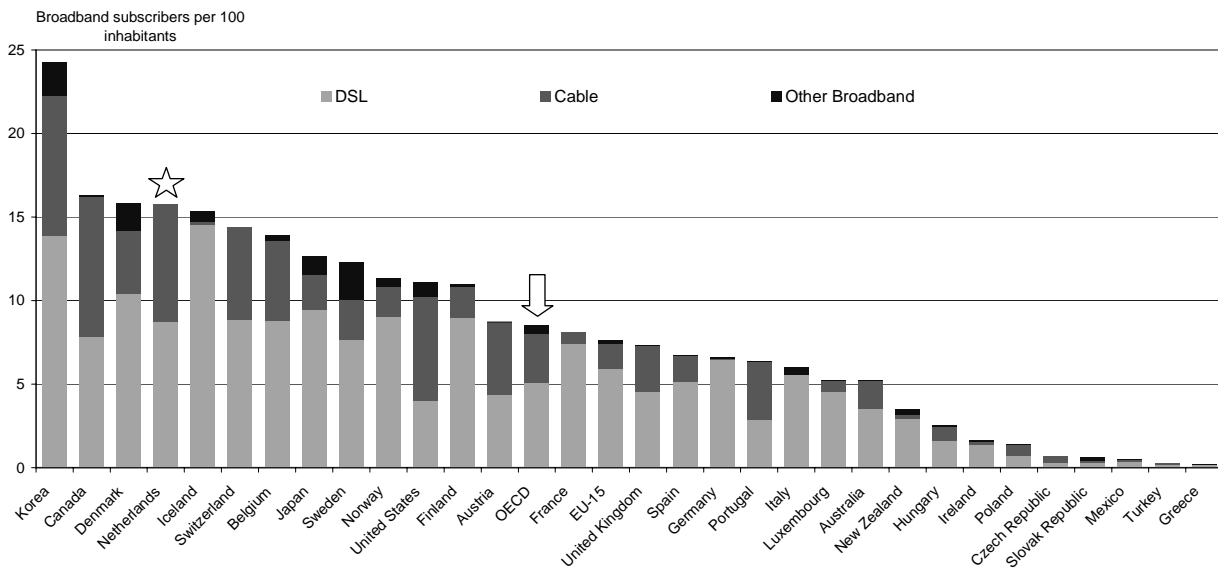
Source: OECD, *Communications Outlook 2005*, forthcoming.

Figure A.6. Cellular mobile penetration per 100 inhabitants, OECD countries, 2003



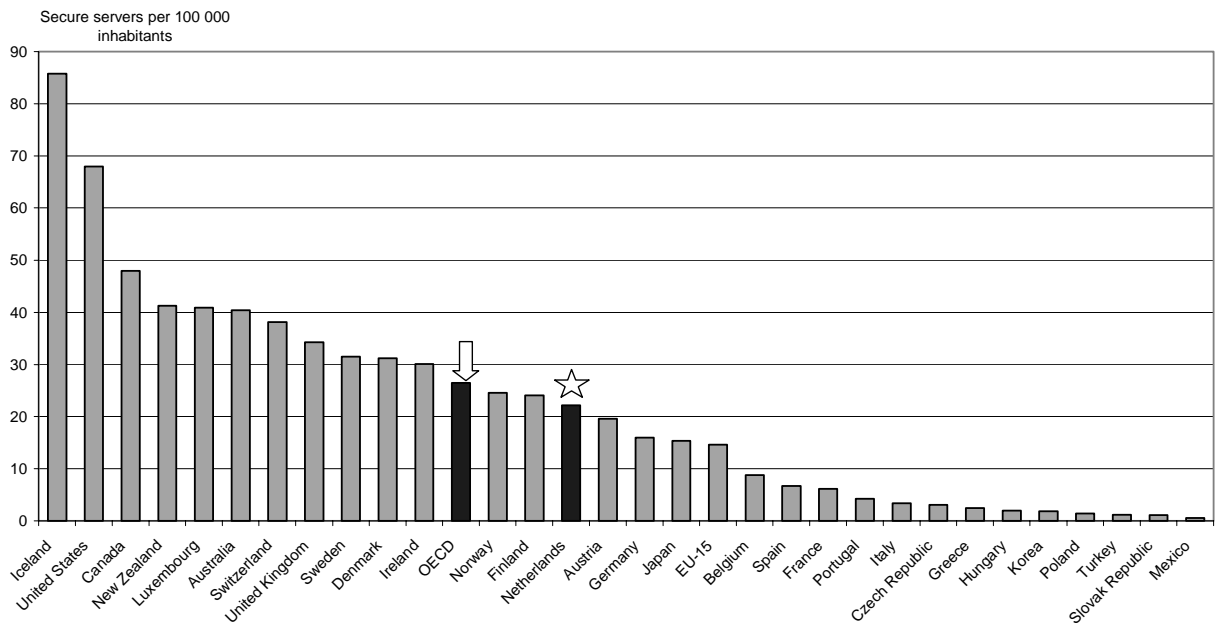
Source: OECD, *Communications Outlook 2005*, forthcoming.

Figure A.7. Broadband subscribers per 100 inhabitants, OECD countries, June 2004



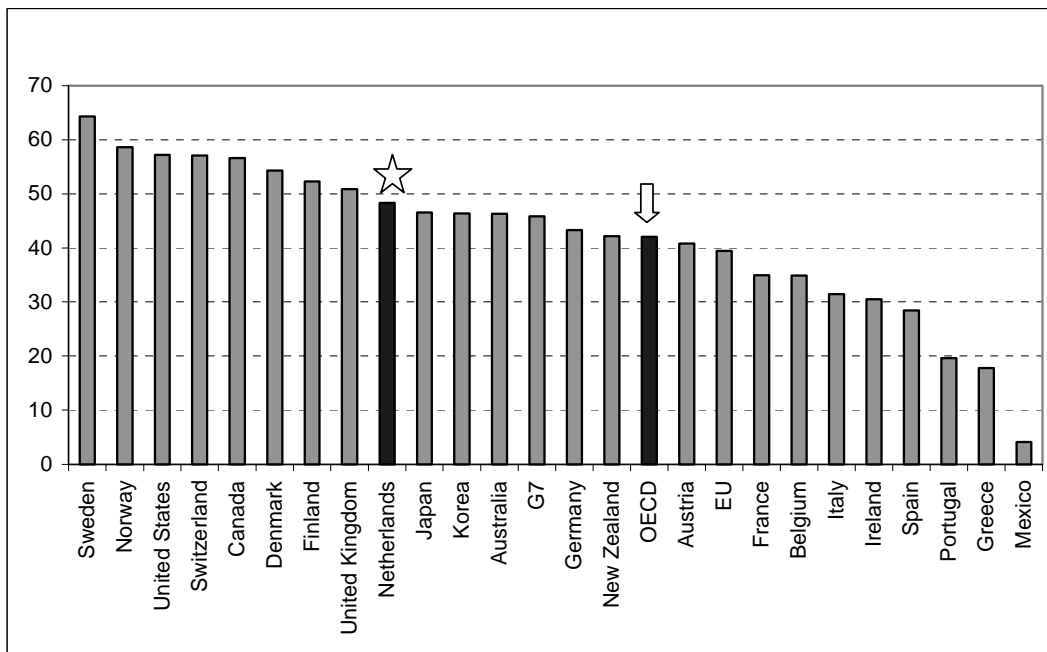
Source: OECD, *Communications Outlook 2005*, forthcoming.

Figure A.8. Secure servers per 100 000 inhabitants, OECD countries, July 2004



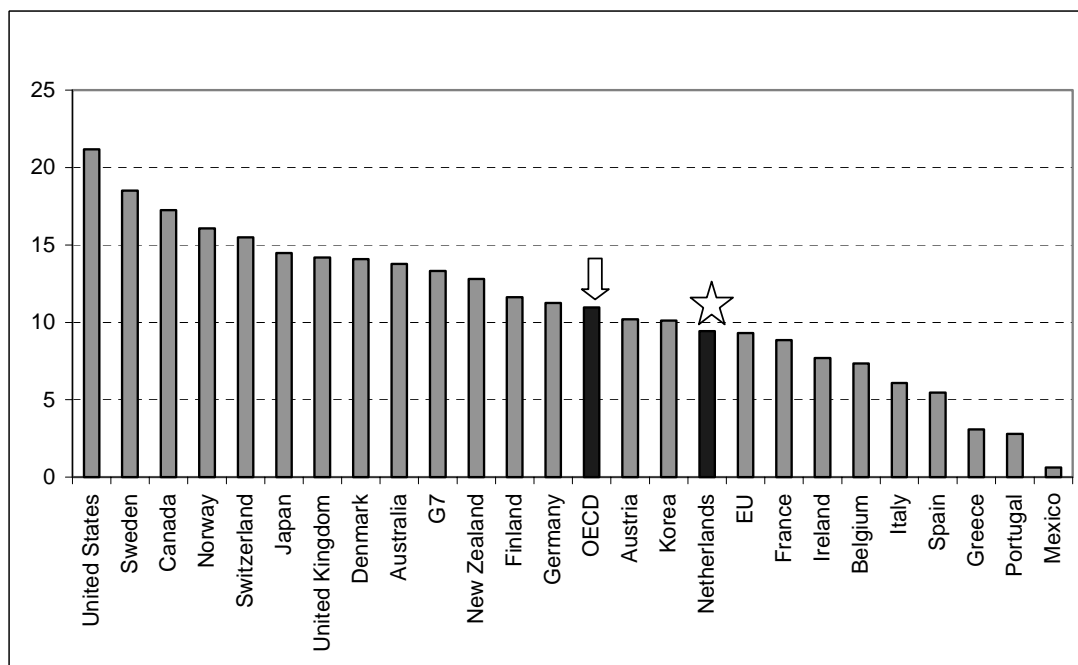
Source: OECD, *Communications Outlook 2005*, forthcoming.

Figure A.9. Number of Internet users per 100 inhabitants, selected OECD countries, 2001



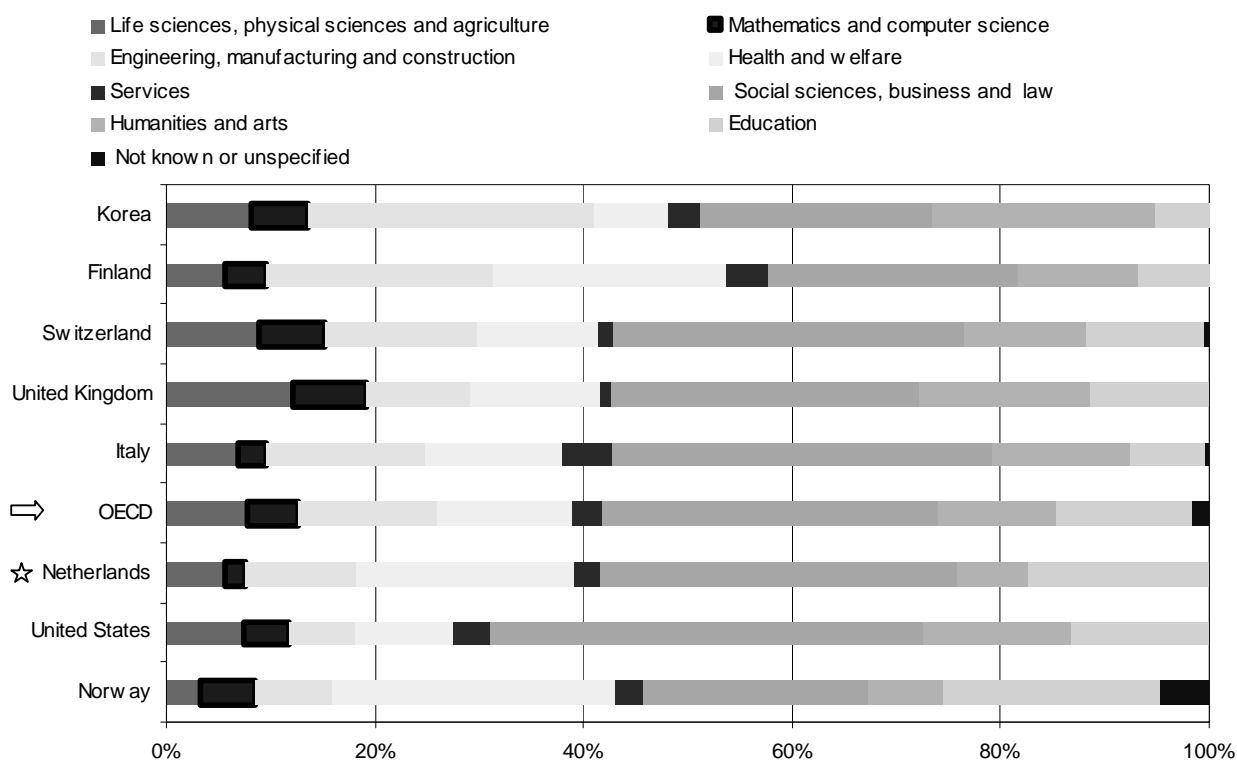
Source: OECD, based on World Information Technology and Services Alliance (WITSA) / International Data Corporation, *Digital Planet 2002*.

Figure A.10. Number of people, per 100 inhabitants, using the Internet for purchasing, selected OECD countries, 2001



Source: OECD, based on World Information Technology and Services Alliance (WITSA) / International Data Corporation, *Digital Planet 2002*.

Figure A.11. Graduates by field of study (2002) Graduates with tertiary-type A and advanced research qualifications, by field of study



Notes: 1. Qualification at the Tertiary-type A level (ISCED 5A).

Source: *Education at a Glance 2004*, OECD.

Table A.3. Percentage of tertiary qualifications¹ awarded to females, by type of tertiary education and by subject category (2002)

	All fields of study					Mathematics and computer science	
	Tertiary-type B (First degree) ²	Tertiary-type B (Second degree) ²	Tertiary-type A (First degree) ³	Tertiary-type A (Second degree) ³	Advanced research degrees ⁴	Tertiary-type B education ²	Tertiary-type A and advanced research programmes ^{3,4}
Finland	51	(5)	63	58	48	48	39
Italy	56	(5)	57	61	52	(5)	52
Korea	55	39	48	34	23	40	43
Netherlands	59	(5)	55	65	38	11	16
Norway	52	(5)	63	53	37	36	24
Switzerland	47	43	44	31	34	18	9
United Kingdom	61	(6)	56	55	42	27	28
United States	59	(5)	57	57	46	36	32
Country mean⁷	57	44	55	51	40	31	30

- Notes:
1. Tertiary graduates are those who obtain a tertiary qualification in the specified reference year.
 2. Qualification at the Tertiary-type BA level (ISCED 5B).
 3. Qualification at the Tertiary-type A level (ISCED 5A).
 4. Advanced research qualifications (ISCED 6).
 5. Category not applicable.
 6. Included with Tertiary-type B (First degree).
 7. Mean of OECD countries.

Source: OECD, *Education at a Glance 2004*.