International ICT benchmark 2002

November 2002

Introduction and reasons for report

The Netherlands in the leading European group on the road to the digital economy: that was the ambition of the then cabinet in the 'De Digitale Delta' ('The Digital Delta') policy document of June 1999. Together, five pillars in this policy document form the basis for the Netherlands' ICT position. In De Digitale Delta the cabinet advised what should be achieved for each pillar, what role the government envisages for itself in this and via which ICT activities the government will fulfil that role.

At the time of the publication of 'De Digitale Delta' the Netherlands, according to IDC/World Times, was seventh out of a group of 55 countries that were best equipped to take advantage of the opportunities provided by information and communication technology (ICT).[1] According to this same source the Netherlands should move up into sixth position in 2003. The Scandinavian countries in particular are bound to relinquish their lead to upcoming ICT countries like Canada, Singapore and Switzerland.

Every two years, starting in 2000, a comprehensive picture is going to be drawn of the relative position of the Netherlands in the information society. In an ICT benchmark like this any changes in the leading group will come to light. What is the position of the Netherlands compared to other ICT leaders? How has the Dutch position changed compared with the previous benchmark? To what extent have the ICT strengths been realised in terms of usage and results? It is also important to examine the latter. After all, it's not just that the Netherlands is ready for the information society. Consumers (businesses, households, local authorities and education) must also take real advantage of the opportunities of ICT.

This international ICT benchmark 2002 is the second complete report on the strength of the Dutch ICT base compared to the global leader.[2] Just like the 2000 benchmark[3] the benchmark compares the Dutch position with that of other leaders in the ICT sector. The five pillars of De Digitale Delta form the point of departure for this benchmark. These pillars are:

- The (tele)communications infrastructure (pillar A)
- Know-how and innovation (pillar B)
- Access and skills (pillar C)
- Regulatory aspects (pillar D)
- ICT in the public sector (pillar E)

1 See the IDC/World Times Information Society Index dated May 2000.
2 Another part of the benchmark relates to sectors instead of countries. In the 'meso-benchmark' 2002 an international comparison is made of the construction, agricultural chains, museums and education sectors. The meso-2002 benchmark will be published at the end of 2002.
3 Hereinafter, the text will use the terms the "2000 benchmark" or the "2002 benchmark" when referring to the international ICT 2000 benchmark or the international ICT 2002 benchmark.

For an optimum comparison with the 2000 benchmark we have decided to use the same test countries where possible. These countries are:

- Australia
- Canada
- Finland
- France
- Germany
- Japan
- Singapore
- Sweden
- The United Kingdom
- The United States

4 These indicators are: the ICT infrastructure (25%), the business climate (20%), the adoption of e-commerce (20%), legislation (15%), the social-cultural infrastructure (15%) and supporting e-services (5%). Moreover, the Netherlands scores particularly well on the (general) business climate (first place) and slightly less well on the ICT infrastructure (eighth place).

5 Various organisations regularly publish this sort of league tables. In the 2000 benchmark for example the IDC Information Society Index (ISI) was presented. According to the most recent publication (ISI 2002) the Netherlands is now in sixth place behind Sweden, Norway, Switzerland, the US and Denmark.

The choice of these countries still appears sufficient. For example, the Economist Intelligence Unit (EIU) published a league table in July 2002, featuring a comparison of countries in terms of E-readiness. The score in the ranking was determined using a compilation of six indicators.[4] According to this EIU ranking the Netherlands should now be in second place. Just behind the US, but ahead of the other countries surveyed in this international ICT benchmark 2002. Such rankings however do not claim to have any absolute and objective worth. But they do give a picture of the ICT position of a country and the changes therein.[5]

Table 1: E-readiness ranking 2002

Country	2002	2001	2000
US	8,41 (1)	8,73 (1)	8,8 (1)
The Netherlands	**8,40 (2)**	**7,69 (10)**	**8,4 (4)**
UK	8,38 (3)	8,10 (3)	8,4 (4)
Sweden	8,32 (5)	7,98 (6)	8,6 (2)
Australia	8,30 (6)	8,29 (2)	8,8 (1)
Germany	8,25 (8)	7,51 (12)	8,2 (8)
Canada	8,23 (9)	8,09 (4)	8,3 (6)
Finland	8,18 (10)	7,83 (8)	8,6 (2)
Singapore	8,17 (11)	7,87 (7)	8,3 (6)
France	7,70 (17)	7,26 (15)	8,1 (9)
Japan	6,86 (25)	7,18 (18)	7,7 (11)

Source: The Economist Intelligence Unit, 2002.

This ranking shows a relatively stable picture for the US and the UK, for example. The position of most other countries, including that of the Netherlands, appears very changeable even over short periods of a year.

What strikes one is the steady fall of France and Japan in particular from the absolute top.

Benchmarking approach

For the 2002 benchmark a large quantity of the most recent published statistics, websites, reports, publications and other relevant sources were consulted and analysed. Appendix 2 gives a list of the sources consulted. In so doing, a balance is always made between completeness, reliability, topicality and the comparison of the figures between each other. Sometimes better and more recent data is available on a national level. But this data has not been included in this benchmark, because it can't always be compared properly with other data. Part of the reason for this is the differences in the survey methods or because the indicators used are defined in a different way. There is, for example, no international uniform definition of the ICT sector.[6] Differences in the time of measuring or a lack of international opportunities for comparison also play a part.

The number of ICT surveys, monitors and benchmark studies has increased, on both a national and international level. For example, in the Netherlands there is the annual ICT Onderwijsmonitor (Education monitor), Statistics Netherlands (CBS) has the serial publication 'De Digitale Economie' (The Digital Economy) and the Sociaal and Cultureel Planbureau (SCP) (Social and Cultural Planning Board) regularly comes out with (comparative) research on the role of ICT in society. On a European level the 'eEurope' initiatives in particular are of interest, in addition to the activities of Eurostat, EITO and other, more one-off studies. Globally, OECD and international reviews in particular, for example from universities, market research and consultancy firms (EIU, IDC, IMD and the like) are of interest. In the individual benchmark countries, too, an increasing number of studies are appearing in which access to, the role of and the use of ICT in society are the focus.

It would be nice if we could determine the position of the Netherlands compared to the benchmark countries at a glance from the sources of information. However, that's not possible. Part of the reason for that is that there is not sufficient data available for all indicators. There are therefore gaps in the area of the ICT skills of citizens and employees and in education. In the area of know-how and innovation and electronic government, too, the necessary statistics are often missing, and there is only very limited international comparative source material available.

6 This problem occurs particularly in chapter 2 on 'know-how and innovation'.

This benchmark has taken into account publications that came out up to and including summer 2002. This does not alter the fact that information from many respected and authorised sources, such as OECD and Eurostat – is based on pre-2001 research. March 2000 was a turning point in ICT. This is not only still palpable on the financial markets, but has since spread to the telecom market and the ICT employment market. As a result some data may come across as 'out of date'.[7] Where necessary and where possible this quantitative data has been supplemented with more qualitative information.

With these limitations in methodology at the back of our minds this 2002 benchmark aims to give a complete overview of the ICT position of the Netherlands compared with other leaders. The structure and presentation of this benchmark are, as far as possible, in line with that of the 2000 benchmark, so that the two benchmarks can easily be compared with each other. More detailed information on the results of the 2002 benchmark features in the underlying five main reports.[8]

7 This is particularly true of some of the information in the pillars A (telecommunication) and B (know-how and innovation). In pillar B data from 1999 sometimes had to be used.

8 Pillar A: 'The Netherlands (tele)communications infrastructure in an international perspective 2002', TNO/STB (STB 02-26), August 2002.
Pillar B: 'International ICT benchmark 2002, pillar B, Knowledge and Innovation', TNO-STB, October 2002.
Pillar C: 'Surfers in the Delta', benchmark access and skills for the international ICT benchmark 2002, Dialogic, July 2002.
Pillar D: 'ICT regulation in the year 2002, A Journey Around the World in Eight Countries and Sixteen Topics, University of Tilburg, June 2002.
Pillar E: 'Report ICT benchmark pillar E: ICT in the public sector', Dialogic, Zenc and M&I Argitek, July 2002.

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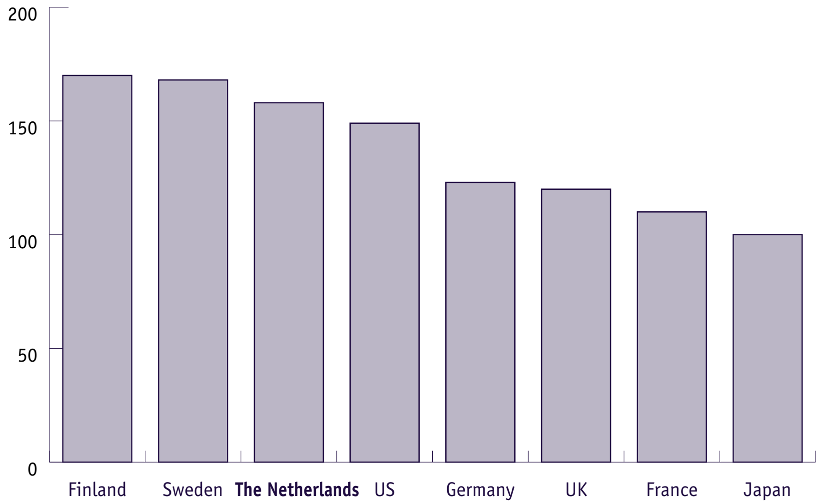
1 Pillar A: The (tele)communications-infrastructure

1.1 Overall position

In the 2000 benchmark the Netherlands was among the leaders in terms of the (tele)communications infrastructure. That is still the case. Figure 1 shows the Dutch score in the league table.[9] With seven countries, an overall comparison was possible. The Netherlands is in third position, behind Finland and Sweden, but ahead of the US. In 2000 these countries also appeared in the top four, albeit in a different order. The differences between them, however, are slight. The UK, France and Japan achieved the lowest scores in the 2002 benchmark. Japan had not yet been included in the league table in the 2000 benchmark.

Figure 1: Overall score on the (tele)communications infrastructure



Source: TNO-STB, 2002a.

Figure 2 shows how the Netherlands scored on the individual indicators. This figure shows on which indicators the Netherlands scores better or worse than the other countries surveyed. A ranking order has been determined for each indicator. The score for the Netherlands is recorded in the figure. The further a country is placed from the origin, the better its position. Figure 2 shows that the Netherlands scores relatively well on:

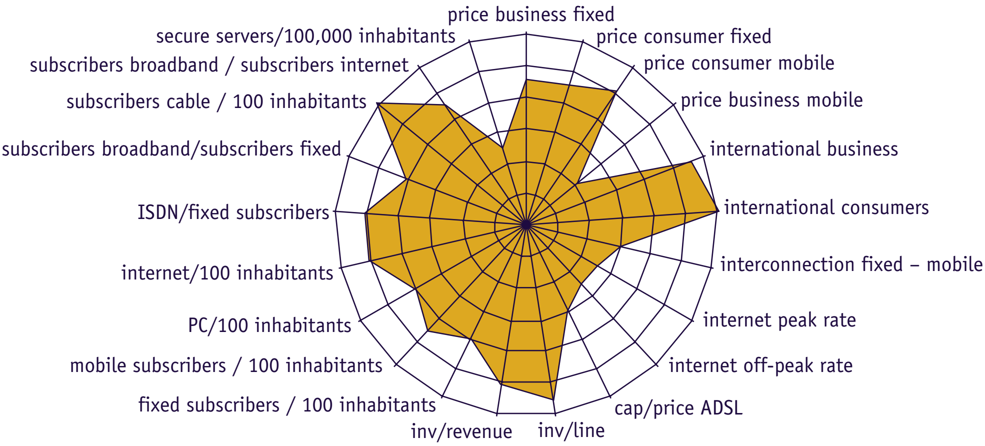
- consumer costs for fixed-line and mobile telephone services

9 This overall score is determined on the basis of 21 indicators. Australia, Canada and Singapore are not included in this overall ranking, because substantiation of all 21 indicators was not possible for these countries. Figures 1 and 2 indicate how the Netherlands scores on the 11 point scale for the indicators. The country with the best score is awarded 11 points, the next 10, etc. See the main report for details.

- investments in infrastructure
- use of the Internet
- the penetration of ISDN connections, mobile telephone services and cable connections

In 2000 the Netherlands scored well on the same points. In 2000 only the score on investments was below the average of the benchmark countries. In this benchmark the Netherlands scores less well on:
- rates for off-peak Internet access
- price-capacity ratio for (A)DSL
- rates when calling from a fixed line to a mobile
- the number of secure servers

Figure 2: The Dutch score on individual indicators



Source: TNO-STB, 2002a.

1.2 Support

1.2.1 Competition safeguards and development of rates

On a number of points a distinction has been made so that we can determine whether competition has developed positively on the Dutch market and whether this development is having the anticipated effect on rates. For example, a distinction is made between the market for fixed-line telephone services, the market for mobile telephone services and the market for Internet access. The latter is split into the market for narrow band access (via the regular telephone line) and for broadband access, for example via cable, (A)DSL, or fibre optics. A distinction is made on all markets between business and home users.

Competition in the market for fixed-line telephone services

In 1998 the deregulation of the Dutch telecommunications market was completed. That led to the entry of a large number of new parties. In particular, providers of cheaper call services via carrier (pre-)selection (CPS[10]) conquered part of the market for fixed-line telephone services. Competition is greatest in the business segment and in international telephone services. The competition in long-distance telephone services is also growing. Competition in local telephone services only emerged in 2002.

KPN's total market share (international, long-distance and local) fell in 2001 by around 10 percentage points, to around 80%.[11] The incumbent[12] KPN therefore has a large, but shrinking market share in fixed-line telephone services. What is of interest here is the fact that competition exists chiefly at a services level (call rates) and not at an infrastructure level (provision of alternative connections on subscription). Thus the number of cable connections – the major alternative infrastructure for a fixed-line telephone service – is only around 1% of the total. Business users in particular have the opportunity to switch to a fibre optic or DSL connection with a competing provider. Business users are of interest due to their large volume (including Internet and datacom traffic) and because of their easily accessible locations. There are not many providers competing in the consumer market.

In most other countries surveyed the telephone service market has a comparable market structure, with the exception of Japan. The telephone service market in Japan has been deregulated, but in practice entry and expansion of market share seem to be relatively troublesome. Number portability[13] has been introduced in all the benchmark countries (including Japan), but does not have the same coverage everywhere.

Competition for mobile telephone services

Competition on the Dutch market for mobile telephone services has increased considerably since the 2000 benchmark. This is also the case in the other test countries. The Netherlands has a relatively large number of mobile telephone providers. A comment on this is the market share of market leader KPN Mobile, which, from an international viewpoint, is high. Since the last benchmark number portability has also been introduced in this market, in nearly all the countries. In the Netherlands there is national number portability for mobile telephone services.

10 A CPS provider buys capacity on a large scale from the owner of the infrastructure and then sells this on to the consumer.
11 Estimate according to OPTA, Vision on the market, Annual Report 2001, March 2002.
12 Term used to indicate the former state enterprises, mostly former monopolies.
13 Number portability allows the user keeps the same number, in the event of a change of address or telecom provider. In the Netherlands, though, numbers can only be taken within a certain region.

Competition for Internet access

There are a large number of Internet service providers (ISPs) operating in the Netherlands. The Dutch still tend to use a fixed telephone line for Internet access. This is also true of the other countries. Such dial-up connections tend to work at lower speeds (narrow band connections) and at time-bound rates (ticking clock). The large number of users of this sort of connection can partly be accounted for by the success of 'free' Internet access. The costs of the ISP are not collected by subscription, but via part of the call charges.

In the Netherlands there is hardly any provision on the consumer market for Internet access based on a flat fee for narrow band Internet. Lengthy surfing via a narrow band connection is therefore more difficult in the Netherlands than in other countries. The ISPs that are part of KPN (Het Net, Planet Internet, XS4all, etc.) have a combined market share of around 42%. In all the benchmark countries the market share of the former monopoly-holder is smaller. Thanks to a number of take-overs, including that of World Online, Tiscali is the second largest ISP in the Netherlands. For users in this country, though, it is relatively simple to switch from one provider to another. As a result the situation with regards to competition, despite the high market shares, is not unfavourable.

With broadband Internet access via the cable and telephone network higher surfing and download speeds are possible at flat rates. For a flat fee the user can stay online 24 hours a day. The greatest share of broadband Internet connections in the Netherlands operate via the cable operator networks. In most other countries this is often via the telephone network (ADSL). At the moment the number of ADSL connections in the Netherlands is growing slightly faster than Internet via cable. But both are growing strongly. Between 85% and 95% of the ADSL subscribers on the consumer market are connected via KPN. In the business market KPN's market share of Internet access is lower, because there are more competitors operating in this segment. Broadband via fibre optics ('Fibre To The Home') and other alternative infrastructures ('Wireless Local Loop', 'Wireless LAN', satellite) currently occupy a very confined position. This is also the case in the other benchmark countries.

Conclusion: in the Netherlands competition in fixed-line and mobile telephone services as well as Internet access has increased. This is particularly true of the business market. KPN remains by far the largest provider in the three different markets. In most of the countries surveyed – with the possible exception of Japan – the development of the market structure is comparable to that in the Netherlands.

1.2.2 Development of rates

Based on the level of competition in the various market segments a particular pattern of expectation is emerging in the development of rates. Below there follows an analysis of this development by market segment.

Rates for fixed-line telephone services

Since the 2000 benchmark the rates for fixed-line telephone services in the Netherlands have fallen further. That's the case in most of the benchmark countries. The Netherlands has relatively low overall rates for fixed-line telephone services (subscription plus call charges). That is the case for both business and home users. In a number of countries (including the Netherlands) there has been a so-called re-weighting of the rates. This was often done in consultation with or under pressure from the national telecommunications watchdog, such as the OPTA in the Netherlands. Re-weighting increases transparency between network maintenance charges and network traffic charges, enabling competition on traffic charges. As a result of this competition the net result of re-weighting in the Netherlands and in most of the other countries is a fall in the overall charges, for both business and home users. The effect of deregulation is noticeable here. In particular, the entry into the market of CPS providers influenced rates. Thanks to the introduction of CPS for international fixed-line telephone services rates are at their lowest level in the Netherlands.

Sweden and Finland also score well. In these countries deregulation came into being quite early. Japan is a notable exception, with relatively high rates and an increase in overall costs. In the other countries, competition is increasing and the rates falling gradually. This trend is expected to continue in the coming years. In several countries the difference between local and long-distance traffic has disappeared. All national telephone traffic is therefore charged at one rate.

In the Netherlands the rates from fixed-lines to mobiles are comparatively high. In most of the benchmark countries these have the attention of the watchdogs. The European Commission also thinks the level of the rates from fixed-lines to mobiles is a general cause for concern. This relates to both end user rates and the underlying interconnection rates from fixed-lines to mobiles. The rates in the Netherlands for the latter were also some of the highest among the benchmark countries in the 2000 benchmark.

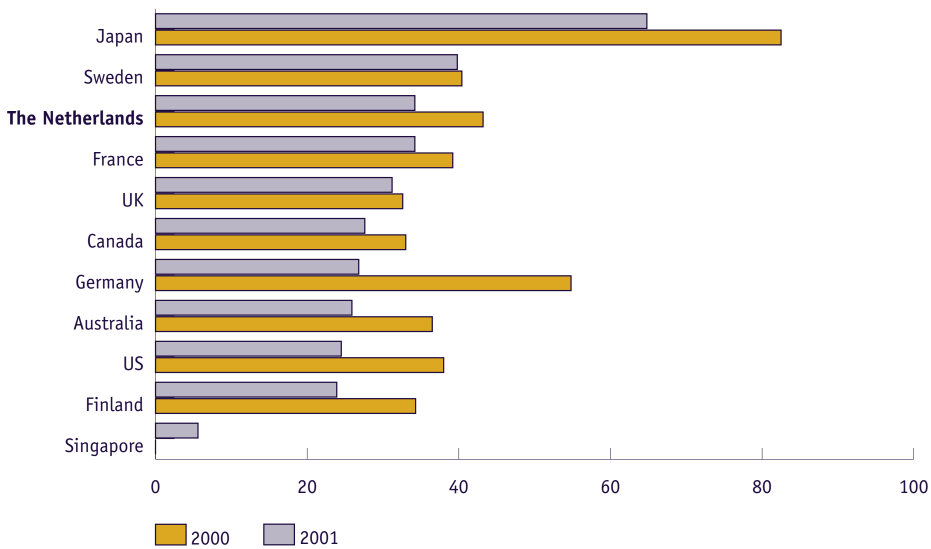
Rates for mobile telephone services

The rates for mobile telephone services fell in the period 2000-2002, chiefly as a result of the rapid development of competition in this market and the strong growth in the number of users. In relation to the other countries subscriber rates in the Netherlands are low. In the US, Japan, Australia and Canada subscriber rates are high. The overall rates for mobile telephone services (subscriptions plus call charges) have fallen in all countries compared to the 2000 benchmark. In countries where market development got underway early the growth in the number of users has fallen. Due to the intensity of the competition the rates in these countries are relatively low. This is particularly true of the Netherlands, Finland and Sweden.

Rates for Internet access

The development in rates for fixed-line telephone services plays an important role in determining the costs of Internet access. In the Netherlands the rates for narrow band Internet access have fallen. In contrast to other countries no flat-fee is offered in the Netherlands. The Netherlands therefore still has relatively high rates, from an international point of view too, especially off-peak (see figure 3). The average charges off-peak at flat rates are, on average, lower than the rates charged per minute.

Figure 3: Costs of Internet access: dial-up for 30 hours off-peak (euro)



Source: OECD, 2001a and ITU.

The introduction of broadband Internet access at flat rates in the Netherlands and most of the benchmark countries has led to an improvement in the ratio between bandwidth and rates. In the Netherlands the bandwidth per euro has risen considerably over the past few years. As a result this country joins the middle group of benchmark countries.

Conclusion: the Netherlands has relatively low overall rates for fixed-line and mobile telephone services. The costs of narrow band Internet access in the Netherlands by contrast are still relatively high. That is because there are virtually no flat rates on offer here. The rates from fixed-lines to mobile phones are still relatively high in the Netherlands.

1.2.3 The innovative nature of the (tele)communications infrastructure

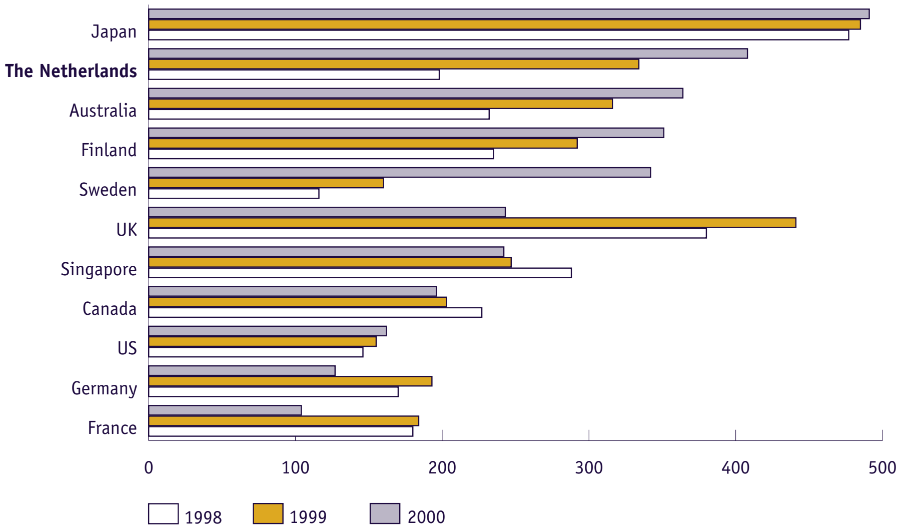
The innovative nature of a telecommunications infrastructure can be measured by virtue of the investment pattern of market players and the penetration of new (access) technologies in the market.

Investments

The total volume of investment in the telecommunications infrastructure increased up to 2000. In 2000 quite a lot of investment was made in the Netherlands, even more than in countries where the process of deregulation and the entry of new providers got underway earlier on.

14 Investments are defined as expenditure on (tele)communications infrastructure including business premises, buildings and intellectual and intangible assets such as software.

Figure 4: Investments per connection in Euro (1998 – 2000)[14]



Source: TNO-STB, 2002a based on ITU.

In the Netherlands investments in the telecom sector per connection increased constantly. In 2000 investments in the Netherlands were nearly the highest, coming second only to Japan. In 2001 investment fell in all the benchmark countries, often by dozens of per cent. Explanations for this at a sector level are the high investments in the period up to 2001 (increasing capacity) combined with negative adjustments of the forecasts for growth of turnover, the fall of stock market prices and the worsening financial position of the telecom companies. At a macro level the decline in economic growth does play a role. The change in circumstances impacts on the modernisation of existing networks and the readiness to invest in the development of alternative infrastructures. Telecom companies are focusing their attention in particular on getting a return on previous investments in the infrastructure. Investment in specific technologies and infrastructures like (A)DSL and UMTS has increased. Given the strong growth in demand for ADSL and the statutory obligation to roll out the UMTS network, that goes without saying. The readiness to invest in the development of other infrastructures will depend on the forecasts for the sector and for the economy as a whole.

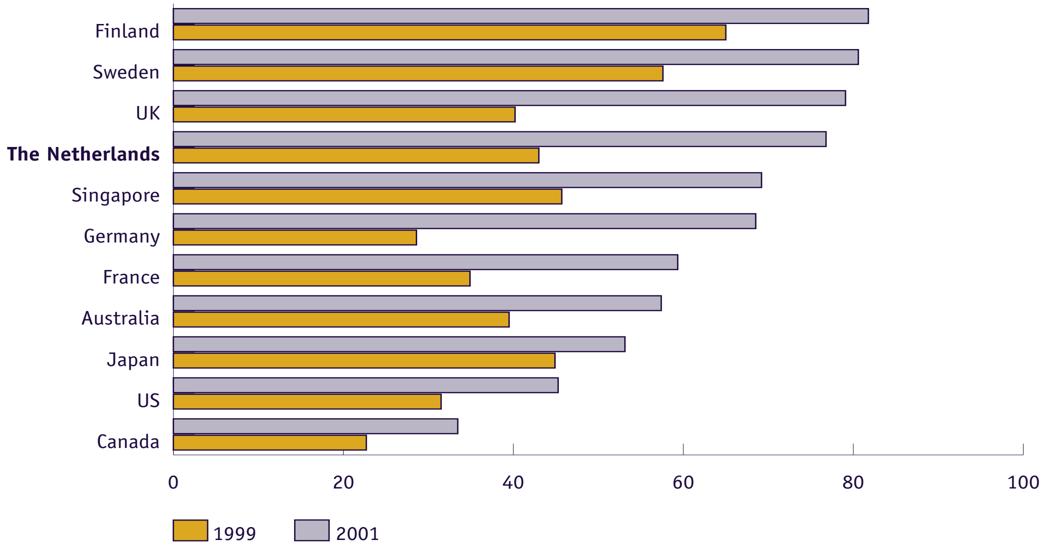
Due to high investments and uncertainty over future demand commercial initiatives do not always get off the ground. For that reason, national and local authorities are stimulating the development of the ICT infrastructure. There are various ways of doing this. In nearly all the benchmark countries there are therefore initiatives to promote research in the area of technology and services. Some countries are investing directly in the laying of a local broadband infrastructure. The Netherlands is stimulating the development of the ICT infrastructure, in particular by subsidising research and development and pilot projects.

Penetration of technologies

The number of fixed-line connections is reasonably stable in the Netherlands and most of the other benchmark countries. In the Netherlands and most of the countries surveyed (analogue) PSTN connections are, though, being replaced by (digital) ISDN connections.

The penetration of mobile telephone services has risen sharply. The Netherlands is, in this respect, in fourth place behind Finland, Sweden and the UK (see figure 5). The growth of mobile telephone services has not (yet) been at the expense of fixed-line telephone services. Only in Sweden do substitution effects seem to be appearing. Currently the market is saturated and growth is stabilising. Competition between the operators will now be aimed more at keeping their own customers and enticing existing customers away from competitors. This may have a positive effect on rates and service provision.

Figure 5: Number of mobile connections per 100 inhabitants



Source: TNO-STB, 2002a based on ITU and OECD (2000a).

The introduction of GPRS technology[15] in mobile telephone services has made a slow start and growth is less rapid than forecast. The introduction of UMTS is also proving less successful than expected. Developments for both GPRS and UMTS are following more or less the same pace and pattern in the various countries.

Development of technologies for Internet access

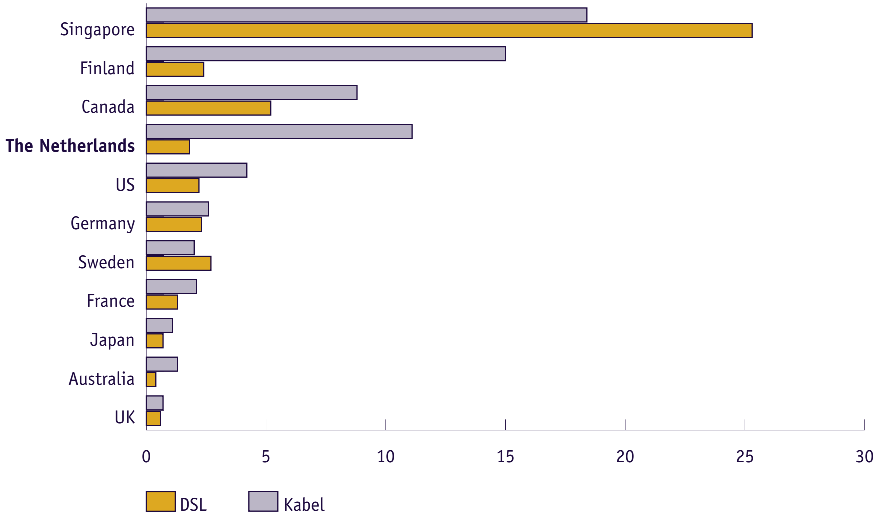
The most commonly used infrastructure for access to the Internet is the telephone network via dial-up connections (PSTN/ISDN), ADSL connections and cable TV. The success of Internet via cable is obviously restricted to the countries where cable networks cover a large part of the country (or the largest cities). They are the Netherlands, Singapore, Finland and Canada. What strikes one is that this infrastructure is used far less intensively in countries where there is a high concentration of cable, such as Germany and Sweden.

The potential and actual range of ADSL in the Netherlands does comparatively well. As shown in figure 6 in 2001 almost 13% of Dutch households had Internet access via a broadband connection, 1.8% via DSL and 11.1% via cable.

15 GPRS (or 2.5G) is a new network technology that makes it possible to send data at higher speeds than was possible with GSM (2G). The best-known service for consumers that is provided via GPRS is i-mode.

In all countries it proved very complex and time-consuming to allow competitors to use the telephone network of the former monopoly holder. As a result there were few alternative providers of ADSL in operation. The strict attitude of national watchdogs and the sharp increase in demand for ADSL connections have won over a lot of businesses, however. Halfway through 2002 there are now around 100 ISPs offering ADSL in the Netherlands (for both the consumer and the business market).[16]

Figure 6: ADSL and cable Internet access as a percentage of total Internet access in 2001



Source: TNO-STB, 2002a based on OECD (2001b) and ITU.

The development of alternative infrastructures

In terms of alternative infrastructures the Netherlands generally does less well than the other countries. Part of the reason for this is that the availability and use of Wireless Local Loop (WLL)[17] and Wireless Local Area Network (WLAN) is relatively low. The development of digital radio and TV is also proving slow. The Netherlands is therefore lagging behind, relatively speaking, in the development of these infrastructures. This can be attributed partly to the fact that there is still no strong 'business case' for the development of alternative infrastructures. The cable infrastructure in this country, after all, is widely available and much used. The presence of an existing infrastructure may therefore be acting as a brake on the development of new, alternative infrastructures. Moreover, in countries with a high coverage and availability of services via alternative infrastructures the number of customers still tends to be relatively small. The share of satellite in the market for radio and television distribution has increased

16 Of the number of ADSL providers, by far the largest number use the wholesale service from KPN and therefore do not take advantage of KPN's duty of access.

17 With Wireless Local Loop a radio signal is used as an alternative to a physical connection from a house to a local exchange. Therefore it is a particularly suitable solution for countries where there is not yet an infrastructure available and where the laying of a WLL connection network is cheaper than the laying of a wire connection network.

from 5% to 7% in the Netherlands in two years. From an international perspective this is still low.

Conclusion: in all the countries surveyed investment in the telecommunications infrastructure since the 2000 benchmark has declined considerably. In terms of innovation the Netherlands scores well, partly thanks to cable, ISDN and mobile telephone services. The Netherlands does not score as well as most of the benchmark countries in the development of alternative infrastructures such as WLL.

1.2.4 Allocation of frequencies

One of the objectives of Dutch ICT policy is the efficient allocation of frequencies. After all, frequencies form a vital building block in many communication infrastructures. The public sale of UMTS licences in the Netherlands has led to an average per capita price of € 10.50 per annum throughout the licence term. This puts the Netherlands in the middle bracket. In the UK and Germany the costs are higher. That is partly due to the market there being bigger and therefore more attractive for current and potential telecom providers. The per capita licence costs per annum are very low in Singapore, Australia, Finland and France. In Japan there were no costs at all. All sorts of specific national factors play a role in the level of costs, for example public sale draft, the starting point (for example the number of existing - mobile - operators) and the timing with regard to UMTS sales and beauty-contests in other countries.

The Netherlands is relatively late in allocating frequencies for WLL, digital TV via the ether (Digital Video Broadcasting Terrestrial, DVB-T) and digital radio via the ether (Terrestrial Digital Audio Broadcasting, T-DAB). The WLL-frequencies have been allocated in most countries, except the Netherlands. However, this 'trailing behind' must be seen in the right light. Despite availability, it so happens that the WLL operators have not succeeded in capturing more than 1% of the total number of connections. At the time of the 2000 benchmark the use of WLL in Europe in 2002 was expected to vary between 3% (the Netherlands) and 14% (Germany) of the total number of broadband connections. Even in the US, where various providers have been operating since as early as 1997, the number of users is still very low.

The first licence for DVB-T wasn't issued until January 2002. The frequencies for T-DAB have still not yet been distributed. Even with these infrastructures it must be pointed out, however, that developments abroad (for the time being) still remain below expectations.

Conclusion: the Netherlands is in the middle bracket in terms of the costs of UMTS licences. The Netherlands is one of the few countries where the WLL-frequencies have not yet been distributed. This lost ground, however, must not be overestimated, in view of the disappointing use in the countries where distribution has taken place.

1.2.5 Reliability of the (tele)communications infrastructure

Investments in the telecommunications sector in the Netherlands have led to a relatively high-grade network. The percentage of faults is low, while the percentage of faults helped within 24 hours, when they do happen, is very high. There are clear indications that the percentage of faults has fallen in the past few years. From an international perspective the Dutch position is therefore outstanding, just as it was in the previous ICT benchmark.

Conclusion: the Netherlands has managed to maintain its strong position in terms of the technical reliability of the infrastructure.

2 Pillar B: Know-how and innovation[18]

2.1 Overall position

The 2000 benchmark revealed that the Netherlands occupied a middle position among the leaders in terms of ICT know-how and innovation. The 2002 benchmark revealed that the Netherlands has held on to this position:

- The Dutch R&D position in the ICT sector is stable: despite the small part that Dutch scientific ICT publications play globally, the Dutch 'quotation impact' is still among the top. Dutch businesses and research institutes apply for relatively few patents. The investments in R&D increased. The Netherlands is still in the middle group, but a long way behind the absolute leaders.
- The Netherlands scores well in the procurement of ICT products. New hardware and software is provided in all sectors of the Dutch economy. The Netherlands has made up lost ground in the adoption of open-source software and is spending considerable sums on ICT service provision.
- Until 2001 the scope and training level of professional IT personnel and the amount of expenditure on ICT training was positive. The shortage of ICT personnel remained structural in 2001, but is no longer as acute as at the end of the nineties. ICT capital in the Netherlands delivers a substantial contribution to the growth of labour productivity.

2.2 Support

The insight into the dynamic of the innovation system is in intense development. That is also true of the statistics that map out innovation processes. This measurement is based on improved indicators, but in addition has a number of limitations. Therefore internationally comparable figures do not necessarily reflect the national measuring methods and definitions, which, for the Netherlands, are sometimes further developed.[19] Certain elements of innovation practices are still (virtually) not measured or cannot be measured at all. That is true of innovation of services, for example. Finally, there is no current data available at all for some indicators. For these reasons this measurement differs from elements of the 2000 benchmark.

18 The survey for pillar B was carried out by TNO-STB, in collaboration with BIE, CWTS and IDC.
19 Cf. CBS publications 'The Digital Economy 2002' and 'Knowledge & Economy 2002'. See also: CPB, 2001.

2.2.1 Technological know-how

This paragraph shows how much the Netherlands invests in the development of ICT know-how and innovation and how much these investments realise. For that purpose the first thing that was looked at was the (direct) input needed to create know-how. These are, in particular, investments in ICT R&D, in terms of expenditure or FTEs. There is no recent international data available on the contribution from public ICT research investment,[20] so the measurement in this benchmark remains restricted to private R&D investments.

The picture becomes more complete when the yields (the output or the return) on the R&D-investments are mapped out, for example how much value product and service innovations in ICT add to the GNP of a country. Unfortunately at the time of this measurement there was no up-to-date internationally comparable data.[21] But there are indicators from earlier phases in the innovation process that tell us something about the throughput of ICT know-how and the direct results of ICT research. For that reason the 2002 benchmark gives a picture of R&D collaboration, registration of new ICT patents, scientific publications and quotes about new ICT know-how.

Private R&D expenditure

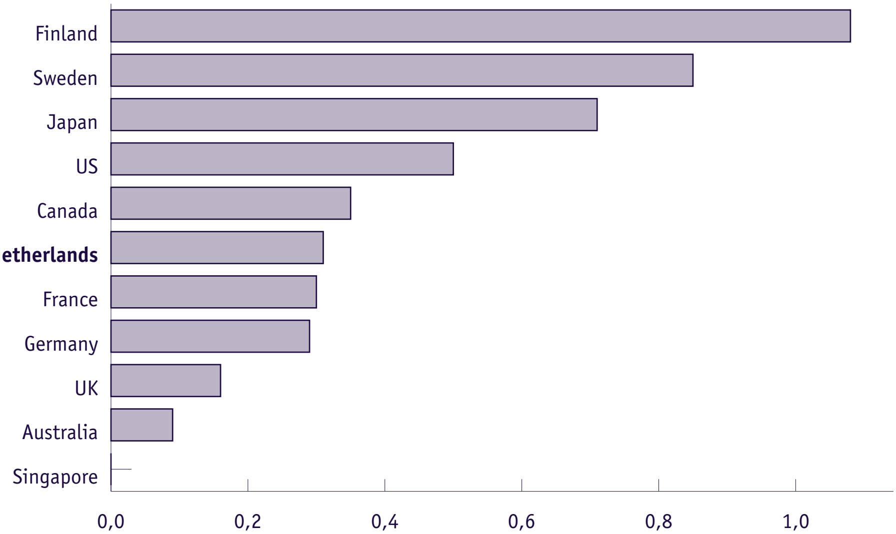
Figure 7 shows that the share of R&D investments from the Dutch ICT business sector in the GDP is roughly 0.3%. As a result the Netherlands occupies a mid-table position among the benchmark countries together with Canada, France and Germany. Finland and Sweden head the group with 1.08% and 0.85% respectively. There is no data for Singapore. Comparison with the 2000 benchmark is not possible, because that time round, all the data related to hardware. In this measurement a broader look has been taken at the ICT sector.[22]

20 Recent figures for the Netherlands on this come from the publication 'Universal ICT knowledge in the Netherlands, from contacts to contracts' (TNO-STB, 2001). In the Netherlands the public ICT survey in mid-2000 involved approx. 1250 FTEs.

21 Internationally comparable information on product innovation – as used in the previous ICT benchmark for example – comes from the Community Innovation Survey (CIS). This CIS is completed once every 4 years and is therefore not expected to be available until 2003.

22 The OECD includes in the 'ICT sector' the ICT production sector in particular (office machines and computers, radio & TV broadcasting and reception equipment, medical and optical instruments, electronic components, wire & cable). A measurement by the CBS shows that after basic research ICT represents the largest R&D-technology field in the Netherlands.

Figure 7: Private ICT R&D expenditure % of GDP



Source: OECD, 2001c, test date 1999.

Conclusion: ICT-producing branches of industry in the Netherlands are average investors in R&D, compared with the same branches in the benchmark countries.

Participation in the European Union's KP5-IST programme[23]

Co-operation is important for the exchange and transfer of ICT know-how for the benefit of innovation. Information has been selected that gives an impression of the extent of R&D co-operation between the (European) benchmark countries. Participants are large as well as small businesses and public and private research institutes. In the IST programmes there is reasonable proportional representation of the European benchmark countries by volume of GNP or size of the population. The Netherlands, Finland and Sweden score above average compared to Germany, which is under-represented in that respect. In light of the decreasing attention paid to participation in KP5 by the Dutch university ICT institutions the Dutch participation cannot be called poor.[24] The partners of Dutch participants are also proportionally distributed over the other European benchmark countries. Given that we are talking about a European R&D programme here, non-European benchmark countries are under-represented.

23 The EU provides for large-scale research programmes, which are revised every four to five years. The Information Society Technology (IST) Programme of the Fifth Framework Programme (1997-2001), has (the most) relevance to ICT. Table 1 is based on Cordis Brick-data on the IST-programme and shows which countries collaborate with other countries in R&D projects, and to what extent.

24 See also TNO-STB, 2001.

Table 1: Extent of joint international participation per country (1997-2001) in European IST-programme [25]

	Germany	UK	France	**The Netherlands**	Sweden	Finland	US	Canada	Japan	Australia	Singapore
Germany	1271	3458	3089	**1247**	689	482	182	119	29	9	3
UK	-	930	2595	**1161**	755	532	137	49	28	17	1
France	-	-	942	**856**	547	331	90	37	22	12	2
The Netherlands	**-**	**-**	**-**	**249**	**244**	**168**	**71**	**18**	**15**	**0**	**0**
Sweden	-	-	-	-	128	166	11	9	2	5	0
Finland	-	-	-	-	-	129	12	3	4	2	1
US	-	-	-	-	-	-	26	4	13	3	0
Canada	-	-	-	-	-	-	-	20	0	0	1
Japan	-	-	-	-	-	-	-	-	0	0	0
Australia	-	-	-	-	-	-	-	-	-	1	0
Singapore	-	-	-	-	-	-	-	-	-	-	0

Source: EG-Liaison/Cordis, 2002.

In the above table it can be seen that Dutch organisations for example (businesses, research institutes, universities etc.) are participating in 1247 projects that German organisations are also participating in.

Conclusion: the Netherlands scores well in R&D co-operation within the European IST programme.

Share of ICT publications in beta publications

The number of ICT publications in a country is related to the total number of beta scientific publications. A picture emerges from this of the extent of specialisation in ICT in the relevant country with regard to related areas of expertise. The Netherlands' share worldwide in ICT research publications is still small. Although the differences between the countries – with the exception of Singapore – are not that marked, Table 2 reveals a gap between the absolute leaders on the one hand, the middle group and those bringing up the rear on the other. In computer publications some countries (France and Sweden) have made up lost ground. Therefore the position of the Netherlands in the league table has deteriorated slightly, whereas in telecommunications the situation for the Netherlands has improved slightly.

25 The countries in the first column are the lead-partners, those on the first row are the partners concerned.

Table 2: Scientific ICT publications for the Computers and Telecommunications sectors as % of the total beta output per country

	Computers		Telecommunications	
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2000 Benchmark
Singapore	15,4 (1)	16,5 (1)	1,5 (1)	1,8 (1)
US	4,7 (2)	4,5 (3)	0,5 (2)	0,5 (4)
UK	4,3 (3)	4,4 (4)	0,5 (2)	0,6 (3)
Canada	4,3 (3)	5,1 (2)	0,5 (2)	0,6 (3)
Australia	3,9 (4)	4,5 (3)	0,4 (4)	0,6 (3)
Finland	3,4 (5)	4,3 (5)	0,4 (4)	0,5 (4)
France	3,4 (5)	3,0 (8)	0,4 (4)	0,3 (6)
Sweden	3,2 (6)	3,1 (7)	0,3 (5)	0,5 (4)
The Netherlands	**3,1 (7)**	**3,6 (6)**	**0,3 (5)**	**0,4 (5)**
Germany	3,1 (7)	3,1 (7)	0,3 (5)	0,3 (6)
Japan	2,8 (8)	2,6 (9)	0,5 (3)	0,7 (2)

Source: TNO-STB based on CWTS, 2002.[26] The test date for 2002 is 2000. For the 2000 benchmark it was 1998.

Conclusion: the share of ICT publications worldwide and compared with the Dutch beta publications has remained unchanged at a low level since the previous benchmark.

Quotation impact of scientific ICT publications

The number of times that other sources quote from publications ('quotation impact') gives a picture of the quality of public ICT research in the benchmark countries. In the 2000 benchmark the Netherlands was one of the leaders as far as the impact of scientific ICT publications was concerned. In the 2002 benchmark our country managed to retain that position. In the computers sector the Netherlands – as in 2000 – emerged runner-up, behind the US. In Telecommunications the Netherlands climbed one place and is now in second place, once again behind the US.

26 In table 2 (and also in table 3) 'Computers' is taken to mean 'computer hardware', 'computer software' and 'computer applications'; 'Telecommunications' is taken to mean 'electro-optical communication', 'telephone & line communication', and 'data communication equipment and techniques'.

Table 3: Index of international scientific impact of ICT publications (1 = worldwide average)

	Computers		Telecommunications	
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2000 Benchmark
US	1,35 (1)	1,33 (1)	1,56 (1)	1,50 (1)
The Netherlands	**1,19 (2)**	**1,14 (2)**	**1,41 (2)**	**1,34 (3)**
Germany	1,11 (3)	1,11 (3)	1,27 (4)	1,34 (3)
Sweden	1,09 (4)	1,08 (4)	1,29 (3)	1,32 (4)
Canada	1,08 (5)	1,07 (5)	1,12 (6)	1,06 (8)
France	1,04 (6)	0,98 (6)	1,06 (9)	1,09 (7)
Australia	0,96 (7)	0,91 (8)	0,96 (10)	0,89 (9)
UK	0,96 (7)	0,97 (7)	1,07 (8)	1,18 (6)
Finland	0,93 (8)	0,91 (8)	1,11 (7)	1,37 (2)
Japan	0,77 (9)	0,76 (9)	1,21 (5)	1,24 (5)
Singapore	0,65 (10)	0,61 (10)	0,67 (11)	0,63 (10)

Source: TNO-STB based on CWTS, 2002.[27]

Conclusion: the impact of Dutch ICT publications remains high. This is true of both the Computers and Telecommunications sectors.

Dutch ICT patent position

Patents give an exclusive right to sell new technology or know-how. In that sense patents act as an indicator of the extent to which a country is geared towards the commercialisation of technical know-how. Dutch businesses and research institutes register few patents, certainly in comparison to the Nordic countries, the US and Japan. The share of ICT patents in the total number of registered patents in a country is an indicator of the extent of ICT specialisation in the overall national patent pool. Table 4 shows that the share of ICT patents in the total Dutch patent portfolio is also modest.

27 The figures from table 3 are compiled based on the relative number of external quotes received – i.e. the number of times that third parties refer to the article in question – adjusted for the number of times they quote themselves.

Table 4: Numbers of ICT patents per million inhabitants, per billion US$ GDP and as a share of all patents[28]

	Number of ICT patents per million inhabitants		Number of ICT patents per billion dollars GDP	Share of ICT patents in total number of patents (%)
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2002 Benchmark
Japan	1444 (1)	1383 (1)	38,6 (2)	23,9 (2)
Finland	663 (2)	587 (2)	28,5 (3)	32,2 (1)
Sweden	541 (3)	443 (3)	21,0 (4)	15,0 (4)
US	433 (4)	306 (5)	11,7 (5)	22,1 (3)
Germany	351 (5)	326 (4)	15,4 (1)	8,9 (10)
France	169 (6)	157 (6)	7,7 (6)	12,9 (8)
UK	162 (7)	147 (7)	6,8 (7)	14,8 (5)
Australia	97 (8)	75 (9)	4,8 (8)	13,2 (7)
Singapore	81 (9)	69 (10)	n.b.	n.b.
The Netherlands	**75 (10)**	**77 (8)**	**3,3 (9)**	**9,9 (9)**
Canada	20 (11)	17 (11)	0,9 (10)	14,6 (6)

Source: TNO-STB based on BIE, 2002. Test date for the 2002 benchmark is the year 2000. For the 2000 benchmark it was 1999.

Conclusion: in terms of ICT patents the Netherlands is in the rearguard of the benchmark countries. The Dutch ICT patent position has even deteriorated slightly in comparison with the previous benchmark.

2.2.2 ICT clusters

In this paragraph we show to what extent ICT has been adopted in the economies of the Netherlands and the benchmark countries. For that purpose the size of the ICT sector is related to its contribution to the added value of the GNP. This provides insight into the importance of the ICT sector. In addition ICT expenditure in sectors on the demand side is outlined, i.e.:

- The ICT expenditure per country
- The sectoral ICT spending per employee
- The expenditure on (specific) software, the expenditure on hardware and the ratio between the two
- Open source software
- e-business and security

28 In this table 'ICT' includes the sub-divisions of computers, telecommunications and peripherals, defined according to the OECD classification (cf. footnote 22). Software is not included. Software can only be patented to an assured level in the US.

The added value of ICT products and services

As the application of ICT in various business sectors grows, the more the added value of the ICT sector will increase.[29] Table 5 shows that the share of added value of ICT products and services in the total added value of the industry and service sectors in all benchmark countries is still quite limited. The Netherlands occupies a sound mid-table position in the services sector, but is below average in the production sector. Furthermore these figures indicate that the Netherlands derives greater added value from ICT service provision than ICT production.

Table 5: Share of added value of ICT services and products in the total added value of the service provision and industry sectors, in per cent

	Added value ICT services	Added value ICT production
Sweden	8,4 (1)	3,1 (3)
UK	8,2 (2)	2,5 (5)
France	8,1 (3)	1,7 (8)
US	7,7 (4)	2,8 (4)
The Netherlands	**6,7 (5)**	**1,8 (7)**
Canada	6,6 (6)	2,0 (6)
Finland	6,3 (7)	6,9 (1)
Australia	5,7 (8)	0,4 (10)
Germany	5,4 (9)	1,6 (9)
Japan	3,8 (10)	4,3 (2)

Source: OECD, 2001, test date 1999.

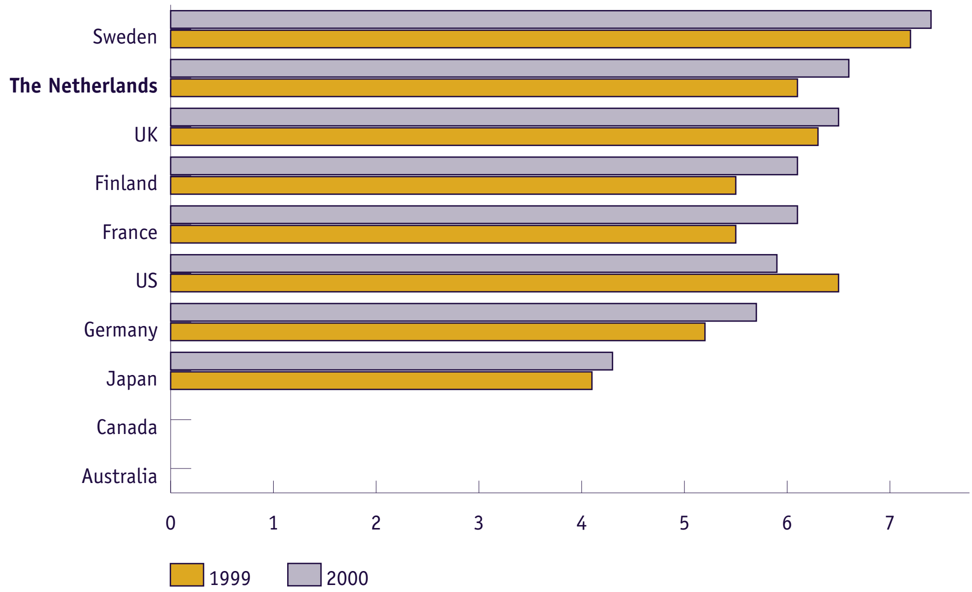
Conclusion: in the Netherlands ICT services have an average added value for the services sector. The added value of Dutch ICT production for the production sector is below average among the benchmark countries.

ICT expenditure per country

The expectation is that expenditure on ICT will grow as the application of ICT in different business sectors grows. Figure 8 shows that the level of ICT expenditure in the Netherlands is high, at 6.6 % of GDP. Only Sweden outstrips the Netherlands. The Netherlands came from fourth position in 1999 (6.1%) and in 2000 overtook the US and the UK.

29 The added value indicates the amount of value, which – in this instance – is assigned to the end product or service by the use of ICT services and products. ICT products and services are defined according to the aforementioned OECD classification.

Figure 8: ICT expenditure as a percentage of GNP



Source: Eurostat/EITO, 2001.[30]

Conclusion: the Netherlands invests a relatively large amount in the procurement of ICT products and services. Compared to 1999 the Netherlands has climbed from mid-table to take the lead.

Sectoral ICT spending

The level of ICT spending per employee gives an indication of the utilisation of ICT in business activities. The thinking behind this is that higher ICT spending may contribute to the innovation capacity and efficiency of the business sector. In addition it relates to investments in hardware, software and ICT services in order to equip the employee for his work.

Table 6 shows the differences in the ICT spending per employee for various business sectors. On average the Netherlands lies in fourth position behind the US, Sweden and the UK (see the last column). The US and Sweden invest slightly more in most sectors - in a number of sectors they even invest significantly more than the Netherlands. The Netherlands is just behind the leaders, along with the UK, France and Finland. Compared with Australia and Germany the Netherlands is investing more in most sectors. In the government sector the Netherlands spends significantly more than most other countries. In business service provision and industry, too, Dutch ICT spending per employee is relatively high. In education, health care and the

30 Eurostat defines ICT as information technology (computer hardware, office equipment, hardware for data communication, software products and services), plus telecommunication equipment and services. Data for Canada and Australia was not available.

agricultural sector the Netherlands invests far less than (most of) the other countries.

Table 6: Indexed ICT spending per employee by business sector

	Agriculture, Construction Mining	Industry	Transport, Communication, Public utilities	Trade	Financial service provision	Business service provision	Government	Healthcare	Education	Other	Average
US	8,06	1,13	3,13	1,24	1,24	1,86	0,56	4,78	4,66	0,19	1,51
Sweden	1,67	1,33	1,06	1,79	2,18	0,75	1,92	1,90	4,79	1,23	1,38
UK	1,03	0,96	0,89	1,12	1,07	0,77	0,81	1,36	3,61	0,96	1,06
The Neterlands	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**
France	0,94	1,09	0,82	1,04	0,75	0,91	0,68	3,38	4,65	0,36	0,99
Finland	0,62	0,94	0,67	1,43	1,18	0,61	1,22	1,42	3,31	1,41	0,98
Canada	4,71	0,89	1,10	0,66	0,84	1,44	0,45	2,36	2,44	0,10	0,90
Japan	1,03	0,68	0,98	1,36	0,42	0,09	1,17	1,01	3,01	1,91	0,87
Germany	1,75	0,79	0,64	0,87	0,71	1,15	0,50	0,94	2,18	1,22	0,85
Australia	1,53	0,32	1,64	0,37	0,74	0,18	0,88	0,99	4,00	1,14	0,75
The Netherlands	**361**	**2.851**	**3.799**	**1.211**	**13.148**	**1.672**	**4.985**	**289**	**308**	**2.108**	**2,178**

Source: TNO-STB based on IDC, 2002, test date 2001.[31]

Conclusion: in most Dutch business sectors ICT spending is in line with the benchmark countries. In the 'government' sector the Netherlands spends a relatively large amount. In the 'education' sector the Netherlands brings up the rear. The healthcare and agricultural sectors also score low.

Ratio of spending on software and hardware

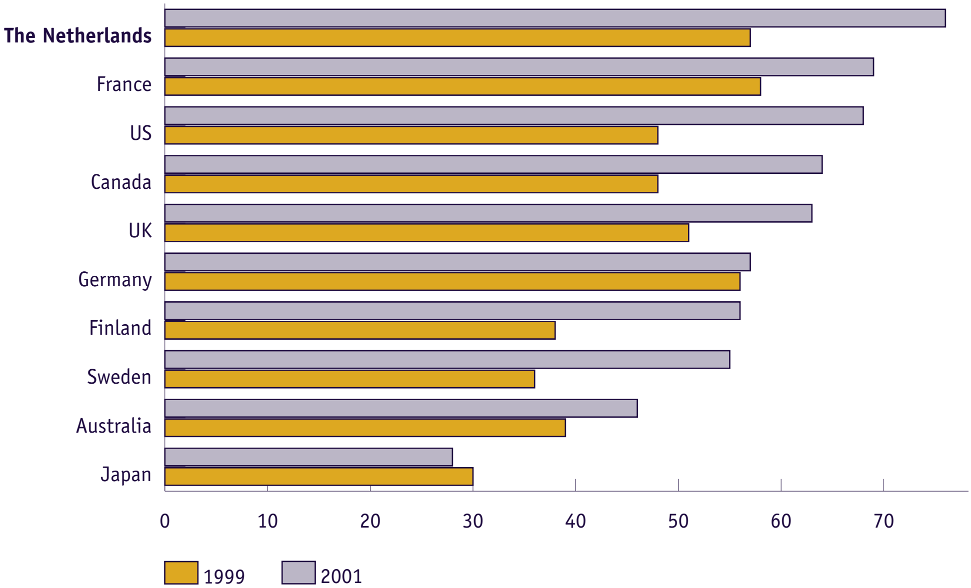
Good, tailor-made software is essential so that good use can be made of hardware. High spending on software indicates that a lot of money is being invested in keeping the usage potential of the purchased hardware up-to-date. At the same time hardware costs are often a lot higher than software expenditure and because of the constantly expanding applications of software ever-more powerful hardware is necessary.

Figure 9 shows the ratio between spending on software and hardware. Expenditure on software is expressed as a percentage of hardware expenditure. The higher this ratio, the more investment is made in new ICT applications. In nearly all benchmark countries software expenditure

31 Sectoral ICT spending is shown as an index figure. The Netherlands is taken as a benchmark; the other countries are compared with the Netherlands. The last column shows the average expenditure over all sectors. The ranking is also determined using this average. The bottom row shows the expenditure per employee in US$.

between 1999 and 2001 increased proportionately. One explanation may lie with the increasing trend of transferring from tailor-made software to package software. This trend started earlier in the Netherlands and France than in the other test countries. The Netherlands continues to invest a lot of money and now occupies a leading position in relation to the other benchmark countries.

Figure 9: Share of software expenditure in relation to hardware expenditure in per cent



Source: TNO-STB based on IDC, 2002.

Investments in specific software

Table 7 gives a picture of the share of businesses that have specific software packages at their disposal. The Netherlands occupies a mid-table position with its share of 'proved' software packages, such as:

- 'Customer Relationship Management' (CRM) software. This software supports organisations in the management and integration of customer relations in business processes;
- 'Supply Chain Management' (SCM): for integrated management of supplies of goods in conjunction with accounting systems;
- 'Enterprise Resource Management' (ERM) software: supports debt and credit management, production, stock control and staffing policy;
- 'Content management' (CM) software: supports management of documents for use on websites.

Dutch companies are more restrained in the acquisition of new applications, such as 'Enterprise Application Integration (EAI)' (combines applications so that they work better with each other) and 'Application Service Provision (ASP)' (gives access to remote software applications). This is not the case with 'XML software', where the Netherlands is in third position with 0.47%. XML software provides the opportunity for exchanging data via the Internet flexibly.

Table 7: Share of companies that have specific types of software at their disposal

	CRM	SCM	ERM	CM	EAI	ASP	XML
Sweden	62,1% (1)	44,2% (1)	31,0% (1)	1,2% (9)	13,4% (2)	1,5% (4)	0,21% (7)
Finland	41,9% (2)	35,5% (2)	22,5% (2)	0,9% (10)	10,3% (3)	2,0% (2)	0,30% (5)
France	40,0% (3)	7,6% (8)	20,8% (3)	2,0% (6)	7,7% (8)	0,4% (10)	0,43% (4)
Australia	30,7% (4)	25,6% (3)	18,8% (4)	1,7% (7)	14,9% (1)	1,5% (5)	0,26% (6)
The Netherlands	**28,0% (5)**	**16,8% (4)**	**15,5% (5)**	**2,3% (5)**	**6,8% (9)**	**0,7% (9)**	**0,47% (3)**
Japan	18,0% (6)	14,7% (5)	10,0% (6)	1,5% (8)	4,1% (10)	0,9% (7)	0,04% (10)
UK	15,2% (7)	7,7% (7)	9,9% (7)	3,1% (3)	9,1% (5)	0,8% (8)	0,83% (2)
Germany	9,0% (8)	8,7% (6)	6,6% (8)	2,4% (4)	8,9% (6)	1,4% (6)	1,03% (1)
Canada	7,7% (9)	2,2% (10)	6,5% (9)	3,2% (2)	8,6% (7)	1,7% (3)	0,07% (9)
US	7,2% (10)	6,7% (9)	4,4% (10)	4,1% (1)	10,0% (4)	3,5% (1)	0,10% (8)

Source: TNO-STB based on IDC, 2002, test date 2001.[32]

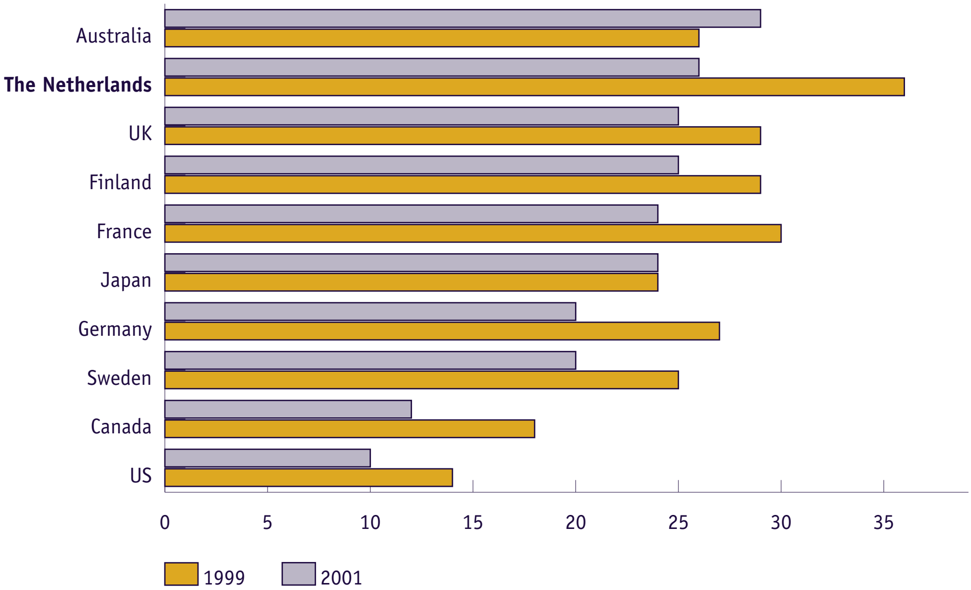
Conclusion: the Netherlands continues to invest a lot in software and occupies a leading position. They occupy a mid-table position with regard to software applications. In addition applications that have been in existence for a while are chosen more often than new applications in general.

Hardware expenditure

The purchase of increasingly powerful PCs and servers makes it possible to integrate more ICT functionalities on one hardware platform and make better use of the possibilities offered by the Internet. All benchmark countries, with the exception of Australia, have taken a step backwards in replacing business PCs compared to the previous measurement. In the Netherlands the retrogression is clearly the largest: roughly twice as big as in the other benchmark countries. The Netherlands had a period of less than three years to replace all business PCs. This has since risen to around four years. This sharp regression may be the consequence of market saturation and of a decreasing effectiveness of incentive schemes (home PC). But otherwise the Netherlands continues to lead the way in replacing business PCs.

32 This shows the percentage of businesses that indicated in the IDC survey that they had the software in question.

Figure 10: Level of replacement of business PCs

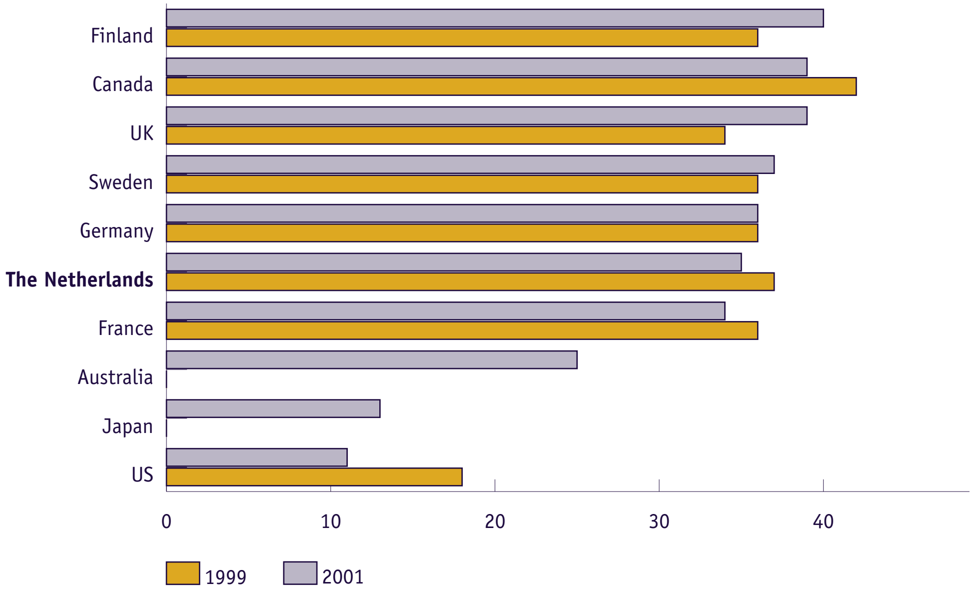


Source: TNO-STB based on IDC, 2002.[33]

Taken as a whole the level of replacement for servers is higher than for PCs. The reason for this is that many companies have switched to 'dedicated servers'. These are servers with a specific usage application, such as mailing or Windows NT. In most countries the percentage of replacement for servers is still growing. In the Netherlands, France and in particular in the US the level of replacement has dropped. Among the leaders the replacement period has fallen to around 2.5 years. For the Netherlands – the leader in the 2000 benchmark - the replacement period has increased slightly to around three years. The US and Japan are experiencing – on account of the current level of replacement – a replacement period of between eight and ten years. A possible reason for this is the life expectancy of servers.

33 The level of replacement is the number of systems that were bought in the business market in the year in question divided by the number of systems in operation. In the levels of replacement sales are adjusted for growth of the park, whereas in the data for the ICT 2000 benchmark that was not yet the case. That explains the differences in scores between the two measurements (see 2000 benchmark, figure 2.11).

Figure 11: Level of replacement of servers



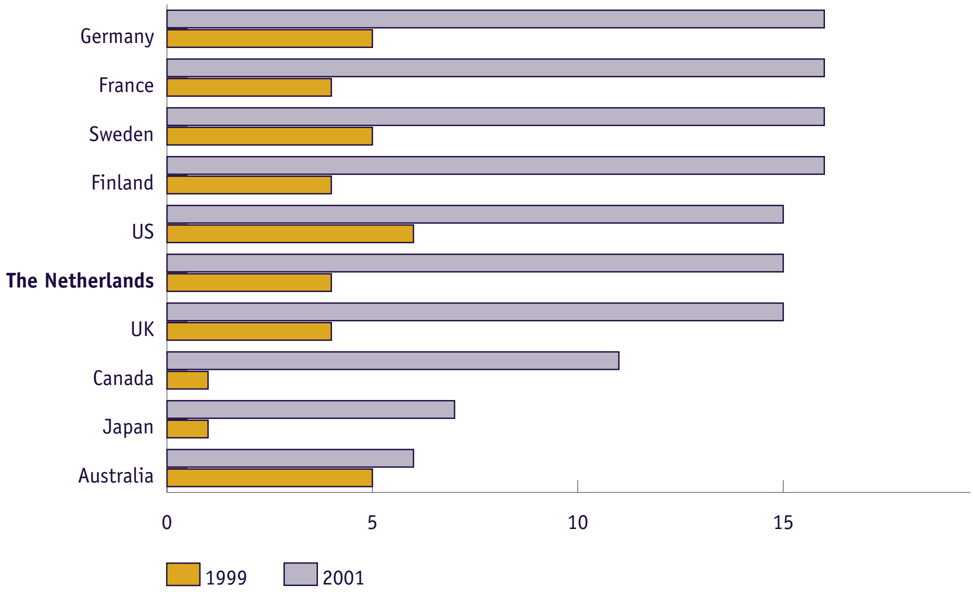
Source: TNO-STB based on IDC, 2002.

Conclusion: the Netherlands continues to lead the way in replacing PCs. Levels of replacement of servers in the Netherlands correspond to the average in the benchmark countries.

Open-source software

Use of open-source software (OSS) contributes to innovation and more efficient deployment of software and ICT experts. The OSS source code is easily accessible, whether or not it's under licence. OSS thereby offers the user more freedom of choice. Moreover the user is less dependent on one single supplier. In this benchmark, data on the procurement of OSS-based Linux-servers acts as an indicator for the adoption of OSS. The Netherlands has made up a reasonable amount of loss ground on this point. The Netherlands now has a Linux-population that is comparable with the majority of the test countries. Figure 12 shows that in all benchmark countries there has been a significant increase in the procurement of Linux servers. In the 2000 benchmark an average of only 4% of the total number of servers were Linux servers. Two years on, that percentage has increased to around 15%.

Figure 12: Share of Linux servers among the total number of servers in per cent



Source: TNO-STB based on IDC, 2002.

E-business and security

The extent of spread of 'Secure Socket Layer' servers acts as an indication for the innovation of (electronic) service provision within a country. Servers that have a Secure Socket Layer (SSL) support secure exchange of data over the Internet. All benchmark countries - including the Netherlands – have seen an increase in the procurement of SSL servers. The Netherlands however is still bringing up the rear. See also table 19 on page 50 of this benchmark.

In addition, in 2001 a relatively small percentage of businesses in the Netherlands offered electronic payment options via the Internet. Table 8 shows that the Netherlands spends relatively little on security software (which is particularly important for e-business applications). This may be a result of previous investments. In 1999 our country was still a leader in this field.

Table 8: Percentage of businesses with payment options on the Internet and the spending on security software as a percentage of all software spending

	Internet payments	Security software
US	10%	3,5% (6)
Australia	10%	6,4% (1)
UK	6%	2,6% (9)
Japan	4%	3,6% (5)
France	3%	2,8% (7)
Germany	3%	2,8% (8)
Canada	2%	5,6% (2)
Sweden	2%	4,9% (3)
Finland	1%	4,4%(4)
The Netherlands	**1%**	**2,5% (10)**

Source: TNO-STB based on IDC, 2002, test date 2001.

Conclusion: as in all benchmark countries the share of open-source software servers in the Netherlands has grown considerably. Despite this fact the Netherlands is still bringing up the rear. The Netherlands also scores low on security software and payment options on the Internet.

Market dynamics: ICT starters and fast ICT growers

Starters and fast-growing businesses are often driving forces for innovation. They bring dynamics into a sector. The growth of turnover in new and fast-growing businesses, as well as the availability of incubator programmes and risk capital are relevant indicators of the dynamics in sectors. There is only limited availability of recent international figures on this. The figures cannot give any detailed overall picture of the most up-to-date (ICT) starter population in the benchmark countries. However, the figures below do give a small illustration of the share of ICT starters in the total number of (techno) starters.

In 1999 the Netherlands had a relatively large number of ICT starters. The list of fast ICT growers shows a familiar picture. The Netherlands has a modest absolute number of the fastest growing technology companies (29, of which 26 were active in ICT). And yet with a share of 8% in 2000 Dutch companies occupied fourth place in the league table of the 500 fastest growers.

Table 9: Share in per cent of ICT in new activity and selection of the fastest-growing companies

	ICT establishments in total number of starters	ICT establishments in technostarters	Fastest-growing companies	
			Share	Number of companies
UK	18 %	56 % (2)	42,00% (1)	148 (1)
The Netherlands	**12 %**	**66 % (1)**	**8,22% (4)**	**29 (4)**
US	6 %	41 % (3)	-	-
Japan	4 %	-	-	-
Germany	1 %	30 % (4)	14,16% (3)	50 (3)
France	-	-	27,20% (2)	96 (2)
Sweden	-	-	5,67% (5)	20 (5)
Finland	-	-	2,83% (6)	10 (6)
			≈ 100,00%	= 353

Source: EIM, 2001, Ernst & Young, 2001, test date 1999 and Deloitte & Touche, 2002, test date 1998 - 2000.[34]

Conclusion: the market dynamic in the ICT sector in the Netherlands seems reasonable. The scant international comparisons indicate that the Netherlands has a large number of ICT starters in relation to the total number of (techno)starters, and a considerable number of fast ICT growers in comparison to the rest of Europe.

2.2.3 Knowledge carriers

Good ICT experts and employees are important for the proper functioning of a (knowledge) economy. ICT knowledge carriers contribute to innovations in products, services, processes and organisations. Training and an efficiently operating labour market generally have a positive influence on the output of the labour potential. This section therefore gives a picture of:

- the IT workforce and the shortage of IT workers
- business spending on ICT training and the share of ICT students in higher education
- the contribution of ICT to the growth of labour productivity

34 The EIM has used various international sources, including the Workforce Statistics, to determine the share of ICT in new activity. On the basis of a sample survey as part of an international survey Ernst & Young has related the ICT share to all high-tech establishments identified in that country (technostarters). Deloitte & Touche surveys the 'European Technology Fast 500' every two years.

IT workforce and employment opportunities

Table 10 shows that in the Netherlands IT workers represent 2.86% of the total workforce. This puts the Netherlands in the middle bracket amongst the leaders. But along with Germany the Netherlands is struggling with quite a significant shortage of IT workers. In 2001, too, there was still a structural shortage of IT workers on the Dutch labour market. The situation is no longer as over-stretched as it was at the end of the nineties. In the 2000 benchmark the Dutch shortfall still stood at 12.6%. What strikes one is the fall in the US of around 19% to 6.92%.

Table 10: share of IT workers in the workforce and the shortage of IT workers [35]

	IT workers among total workforce		Shortage of IT workers among total number of IT workers	
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2000 Benchmark
Australia	3,89% (1)	-	-	-
Canada	3,75% (2)	-	-	-
US	3,16% (3)	2,8% (2)	6,92% (2)	19,6% (7)
Sweden	2,99% (4)	2,9% (1)	8,23% (5)	13,3% (6)
The Netherlands	**2,86% (5)**	**2,6% (3)**	**8,26% (6)**	**12,6% (5)**
Japan	2,83% (6)	-	-	-
Finland	2,71% (7)	1,6% (6)	7,16% (3)	9,0% (2)
France	2,45% (8)	2,2% (4)	6,54% (1)	7,9% (1)
Germany	2,20% (9)	1,6% (6)	9,80% (7)	12,5% (4)
UK	2,08% (10)	2,0% (5)	8,10% (4)	9,7% (3)

Source: TNO-STB based on IDC, 2002. Test dates 2001 and 1999 respectively.

Conclusion: the Netherlands has an average-sized IT workforce. The IT shortage on the labour market was also structural in 2001, but no longer as acute as at the end of the nineties.

ICT related training expenditure and ICT students

Because of the rapid changes in ICT employees must constantly attend training courses. The spending on ICT training in any branch of industry is closely linked to the economic structure of the country (for example the share a branch of industry has in the total number of job opportunities). In table 11 the total spending in the branches of industry is divided by the population of a country. That produces a relatively neutral reference criterion. After Sweden and the US, the Netherlands is among those countries with the highest per capita IT expenditure on training (see the last column of table 11). There is a big difference between these countries

35 This definition disregards the workforce in communication equipment and services and therefore only measures the IT workforce.

however. The Netherlands is one of the runners-up, along with Canada and Finland. The major European countries, Japan and Australia score relatively badly. A breakdown of the IT expenditure by branch of industry shows that:

- the Netherlands scores well in the sectors of financial service provision, business service provision and government
- the Netherlands performs in the sectors of industrial production and care is mediocre
- the education sector in fact scores very low (second from bottom)

Table 11: Per capita expenditure on ICT training by sector in euros

	Agriculture	Industrial production	Transport & communication	Retail	Financial service provision	Business service provision	Government	Healthcare	Education	Other	€ Per inhabitant total
Sweden	1,36	13,98	5,57	8,18	6,02	2,39	11,36	2,16	2,27	0,11	53,30 (1)
US	1,19	10,76	8,11	4,90	8,64	4,53	3,44	1,67	1,55	0,08	44,87 (2)
The Netherlands	**0,57**	**6,48**	**4,09**	**4,53**	**9,43**	**3,71**	**7,11**	**0,69**	**0,25**	**0,25**	**37,16 (3)**
Canada	1,27	10,49	5,39	3,41	5,78	3,80	2,27	1,36	0,97	0,10	34,87 (4)
Finland	0,58	8,65	4,04	5,77	4,04	1,54	7,11	0,96	1,15	0,38	34,42 (5)
Germany	1,27	8,74	2,17	2,64	3,40	2,56	3,86	0,40	0,49	0,40	25,91 (6)
France	0,53	9,03	2,75	2,53	3,45	1,21	4,06	0,63	0,92	0,15	25,26 (7)
UK	0,35	4,35	2,88	3,46	7,51	1,51	3,26	0,64	0,70	0,12	24,77 (8)
Japan	0,17	5,55	2,02	2,54	1,51	0,11	1,99	0,33	0,46	-	14,59 (9)
Australia	0,10	1,67	1,35	0,47	1,77	0,05	1,04	0,10	0,10	-	6,82 (10)

Source: TNO-STB based on IDC, 2002, test date 2001.

Table 12 shows that compared with the other benchmark countries there are fewer trained ICT specialists in the Netherlands. This means that a solution to the shortage of ICT workers is not being met by those coming out of training courses. Compared with the 2000 benchmark the Netherlands has fallen three places, despite the percentage staying almost the same. This is explained in part by the fact that there is now data available for more countries. Some countries, like Canada and the UK, have, in percentage terms, made an obvious leap forwards. Germany shows a considerable drop.

Table 12: Number of ICT students in higher education

	2002 Benchmark (%, 2001)	2000 Benchmark (%, 1999)
UK	5,0 (1)	4,2 (1)
France	4,0 (2)	-
Australia	3,9 (3)	-
Canada	3,5 (4)	2,6 (3)
Sweden	3,0 (5)	-
US	2,5 (6)	2,1 (4)
Finland	2,2 (7)	2,1 (4)
Germany	2,1 (8)	3,1 (2)
The Netherlands	**1,5 (9)**	**1,4 (6)**

Source: OECD, 2002, test date May 2001.

Conclusion: the Netherlands invests relatively large amounts in ICT training per employee, especially in the sectors of government, financial and business service provision. In the education sector the Netherlands spends significantly less than the other benchmark countries. The Netherlands brings up the rear with the share of ICT students in higher education.

ICT and labour productivity

GDP growth is realised by greater deployment of capital and labour and the more effective utilisation of both. The Netherlands has high labour productivity. Table 13 does show that the growth of Dutch labour productivity has levelled out and now falls short of the leading benchmark countries.[36] Furthermore the table shows that progressive placing of ICT capital in industrial processes contributes more to higher labour productivity than the deployment of other capital. This trend was reinforced in the period 1996-1999 compared with the previous period (1991-1995). In the Netherlands the absolute contribution of ICT capital to labour productivity fluctuates between the OECD and the EU average. The relative contribution of ICT capital to the growth in labour productivity in the Netherlands is good compared to the benchmark countries. The influence of ICT use on the ‘total factor productivity’ (TFP) through spillover effects (e.g. through organisational changes) has not yet been clearly demonstrated on a macro level.

36 The table shows the average annual percentage movements in labour productivity growth per hour worked and the contribution from ICT capital, other capital and total factor productivity (TFP) in percentage points. ICT capital includes software. No data is available for Australia, Canada, Germany, France or Sweden.

Table 13: Decomposition of the growth of labour productivity (business sector) in several benchmark countries for the period 1990-1999

	Growth in labour productivity		Contribution of TFP		Contribution of ICT capital		Contribution of other capital	
	1996-1999	**1991-1995**	**1996-1999**	**1991-1995**	**1996-1999**	**1991-1995**	**1996-1999**	**1991-1995**
Finland (a)	3,5	3,9 (1)	4,5 (1)	2,5 (1)	0,5 (6)	0,6 (1)	-1,3 (7)	0,7 (3)
US (b)	2,6	1,5 (5)	1,5 (2)	0,9 (3)	1,0 (2)	0,5 (2)	0,1 (3)	0,1 (6)
OESO (c)	2,1	1,8 (4)	0,9 (5)	0,8 (4)	0,7 (4)	0,4 (3)	0,4 (2)	0,7 (3)
Japan (c)	1,9	1,2 (7)	0,2 (6)	-0,5 (7)	1,1 (1)	0,6 (1)	0,6 (1)	1,1 (1)
UK (c)	1,8	3,4 (2)	1,1 (3)	2,3 (2)	0,8 (3)	0,4 (3)	-0,2 (6)	0,6 (4)
The Netherlands	**1,5**	**1,3 (6)**	**0,9 (5)**	**0,5 (5)**	**0,6 (5)**	**0,4 (3)**	**0,0 (5)**	**0,4 (5)**
EU (e)	1,5	2,0 (3)	1,0 (4)	1,0 (6)	0,3-0,5 (7)	0,2-0,3 (4)	0,0-0,2 (4)	0,7-0,8 (2)

Source: Dutch Ministry of Economic Affairs, 2002, using: a Jalava and Pohjola, 2001; b Oliner and Sichel, 2000; c Goldman Sachs, 2000; d Van der Wiel, 2001 (second period relates to 1996-2000); e European Commission, 2000 (overall economy).

Table 14 differentiates the growth of labour productivity by sector. The Netherlands scores well with the growth of labour productivity in ICT-intensive services.[37] In the ICT-producing industry the growth of Dutch labour productivity occupies a relatively low position in the middle of the benchmark countries. Data that is only available for the Netherlands reveals that the deployment of ICT capital contributes particularly to the growth of labour productivity in the ICT-producing and ICT-intensive sectors.[38]

37 Average annual percentage movements in labour productivity per member of the working population. There is no data for Australia.

38 See Van der Wiel, 2001.

Table 14: Growth of labour productivity by sector groups for the period 1995 - 2000

	ICT-producing industry	ICT-producing services	ICT-intensive industry	ICT-intensive services	Non-ICT industry	Non-ICT services	Non-ICT other
Finland	28,7 (1)	7,7 (2)	2,6 (3)	2,8 (3)	2,8 (1)	0,3 (4)	2,2 (2)
Japan	22,6 (2)	4,0 (6)	0,8 (9)	0,5 (8)	-0,3 (10)	0,4 (3)	-1,4 (8)
US	20,2 (3)	3,8 (8)	2,1 (6)	4,4 (1)	1,3 (6)	0,1 (5)	0,4 (6)
UK	18,5 (4)	5,0 (5)	1,3 (8)	1,5 (4)	0,2 (8)	1,6 (1)	-1,6 (9)
Germany	16,6 (5)	11,4 (1)	3,3 (1)	0,8 (6)	0,0 (9)	0,1 (6)	2,5 (1)
EU	14,9 (6)	5,7 (4)	2,2 (5)	0,6 (7)	1,0 (7)	0,4 (2)	1,2 (3)
The Netherlands	**14,1 (7)**	**5,7 (4)**	**3,0 (2)**	**1,3 (5)**	**2,1 (4)**	**0,0 (7)**	**0,1 (7)**
France	13,8 (8)	6,1 (3)	2,3 (4)	0,3 (9)	2,7 (2)	0,4 (3)	1,2 (3)
Sweden	12,4 (9)	3,9 (7)	2,2 (5)	3,6 (2)	2,2 (3)	1,2 (2)	1,1 (4)
Canada	11,4 (10)	2,9 (9)	1,6 (7)	-0,1 (10)	1,4 (5)	-0,4 (8)	0,9 (5)

Source: Van Ark, Inlaid and McGuckin, 2002.

Conclusion: In the Netherlands the deployment of ICT capital contributes to a higher growth in labour productivity, comparable with the benchmark countries. In the ICT-intensive industry the growth of Dutch labour productivity compares favourably with the test countries. In the ICT-producing industry the growth in Dutch labour productivity occupies a relatively low position.

3 Pillar C: Access and skills

3.1 Overall position

In the 2000 benchmark the Netherlands was found to have an average to reasonable score on the section dealing with access to the information society. The Netherlands was not, however, among the leaders in the field of ICT in education. Our country is now doing considerably better. In the home, work and school environment access to and the use of ICT has increased significantly. That is particularly true of computers and the Internet. Dutch households are now among the (absolute) leaders. Access in the business environment has also improved, but this improvement has been too limited for a climb up the league table. The Netherlands is in the middle bracket in terms of Internet penetration in companies. As far as the number of computers in businesses is concerned the Netherlands is trailing behind. The differences between the other benchmark countries and us, however, are small. In education, too, access has greatly improved. Virtually all schools have Internet access. A relatively large number of schools have broadband. In the other benchmark countries, too, the number of computers and Internet connections in education has increased significantly. The relative position of Dutch education has hardly changed as a result. What is new compared to the 2000 benchmark is the insight into access via public Internet points. The Netherlands scores low on this.

Just as in the 2000 benchmark it is still difficult to make any statement regarding skills. The amount of current and internationally comparable data is very limited. Internationally comparable data is only available for a single indicator – for example Internet banking. A relatively large number of Dutch households appear to bank via the Internet. Growth compared with the 2000 benchmark however is limited.

ICT is becoming increasingly important in Dutch households. Internet use among the population has grown. In other countries its use has grown even more. On balance the Netherlands has therefore fallen from second to fourth place. The share of Internet users in the Netherlands that shop online has grown from 12% to 18%. That secures a position mid-table. Of the European countries the Netherlands has the highest per capita e-commerce turnover after Finland and Sweden.

Dutch businesses are in the middle bracket in the use of computers, Internet and websites. But Dutch businesses are the absolute leader in the use of CRM software packages.[39] With online product sales Dutch businesses

39 CRM stands for Customer Relation Management.

are solid average performers. But in online purchasing the Dutch business sector performs significantly less well. The performance by Dutch companies in offering transaction opportunities on websites is also mediocre. Computers and the Internet are relatively well-integrated into education in the Netherlands.

3.2 Support

3.2.1 Access to the information society

Access in the home environment

Compared with the other countries the penetration of computers in households is highest in the Netherlands. The Netherlands is also keeping up well with Internet penetration. This can be seen in the following table.

Table 15: Computer and Internet penetration in households in per cent

Country	Number of computers in %		Internet penetration in population (2 years and older) in	
	2002 Benchmark Households with computer	2000 Benchmark Per 100 inhabitants	2002 Benchmark	2000 Benchmark
The Netherlands	**74 (1)**	**40 (6)**	**58 (3)**	**33 (7)**
Sweden	60 (2)	51 (2)	65 (1)	44 (2)
Singapore	59 (3)	39 (7)	51 (6)	42 (4)
Canada	58 (4)	48 (5)	53 (5)	43 (3)
Australia	53 (5)	49 (4)	54 (4)	37 (6)
US	51 (6)	54 (1)	60 (2)	49 (1)
Japan	51 (7)	33 (9)	40 (9)	21 (9)
Finland	50 (8)	51 (2)	42 (8)	42 (5)
Germany	47 (9)	32 (10)	39 (10)	19 (10)
UK	46 (10)	38 (8)	49 (7)	33 (8)
France	34 (11)	32 (10)	20 (11)	15 (11)

Source: OECD, 2002 and Nielsen Netratings, 2002, test date 2001. Figures on Internet penetration are from February 2002.

The Netherlands has made an enormous leap forwards in both these areas, in both absolute and relative terms. The Netherlands has risen from six to first place, in terms of penetration of computers in households. The Internet penetration among the Dutch population has risen from 33% to 58%. As a result, among the leaders the Netherlands has risen from seventh to third place. Compared with two years ago Dutch households have therefore made up a lot of lost ground compared with the other test countries. What strikes one are the changes in position for the US (from first to sixth place) and Finland (from second to eighth place) in terms of the number of households with a computer.

Other results in terms of access in households are:
- The Netherlands (along with Australia) has the highest number of Internet hosts after the US and Finland, i.e. 11.8 per 100 inhabitants. In the 2000 benchmark the Netherlands was in fifth place with 8.5 Internet hosts per 100 inhabitants;
- In the Netherlands – just as in the other benchmark countries – there is talk of a digital divide. Relatively speaking, households with a low income and no children are less likely to have a computer and Internet access at their disposal;
- As pillar A shows, the Netherlands is a good average performer among the benchmark countries in terms of broadband penetration (fourth out of the eleven countries).

Conclusion: the Netherlands has moved up among the absolute leaders in the penetration of computers and the Internet in households.

Access in the working environment

In the working environment, too, computer and Internet penetration has increased. But the picture here is less positive than for households.

Table 16: Internet and websites in the SME [40]

Country	% SME with Internet access			% SME with a website
	2002 Benchmark		2000 Benchmark	2002 Benchmark
	10-49 employees	50-249 employees	All businesses	More than 10 employees
Finland	91 (1)	96 (1)	-	49 (2)
Sweden	85 (2)	93 (3)	-	47 (4)
UK	80 (3)	81 (9)	62 (5)	40 (5)
Germany	79 (4)	87 (6)	65 (4)	54 (1)
The Netherlands	**79 (4)**	**88 (5)**	**54 (6)**	**48 (3)**
Australia	76 (6)	93 (3)	- [41]	24 (9)
Canada	76 (6)	95 (2)	75 (3)	-
US	70 (8)	87 (6)	68 (2)	30 (7)
France	-	-	34 (7)	33 (6)
Japan	-	84 (8)	78 (1)	18 (8)

Sources: OECD, 2001d (columns 1 and 2) and Eurostat, 2001 (column 4, test date 2000).

Since the last benchmark the Dutch SME has made a considerable leap forwards. In the 2000 benchmark slightly more than half (54%) of all businesses had an Internet connection. Now the SME (with 50 - 249 employees) is in fifth place with 88% and in fourth place with 79% (with 10 - 49 employees) respectively. In larger companies this percentage tends to be even higher. Thus the Dutch SME is a good average performer. Dutch SMEs quite often have their own website. Finally, around 93% of Dutch companies have at least one computer (not recorded in the table). This puts the Netherlands in last place out of the eight benchmark countries, for which information is available. The differences between them and the leaders, however, are very small.

Conclusion: the Dutch SME has made a leap forwards with Internet access in absolute terms, but despite that is still in the middle group.

Access in the educational environment

The access to ICT in schools is divided into primary and secondary education.

40 The categories 10 - 49 and 50 - 249 employees differ from the 2000 benchmark. NB: figures presented in this benchmark always refer to SMEs with more than 10 employees. The figures for all SMEs are generally lower. For example, of the SMEs with more than 5 employees 'only' 37% have their own website (CBS, 2002a). The data in the 2002 benchmark refers to the first quarter of 2001. No data is available for Singapore.

41 This percentage is based on a source that measures Internet access at branch level, and as a result the degree of penetration at business level is probably underestimated.

Table 17: Core figures on the infrastructure in primary education [42]

	Number of pupils per computer		Computers more than 3 years old in %	Computers with Internet connection in %	Schools with Internet connection in %		Internal network in %
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2002 Benchmark	2002 Benchmark	2000 Benchmark	2002 Benchmark
US	4,2 (1)	-	-	-	97 (3)	87 (2)	-
Singapore	6,6 (2)	11,8 (3)	-	-	100 (1)	-	-
Finland	7,5 (3)	13,5 (2)	40,1 (4)	62,7 (4)	99 (3)	87 (2)	13 (5)
Canada	8 (4)	8,8 (1)	-	52 (2)	-	88 (1)	-
The Netherlands	**8,4 (5)**	**17,9 (4)**	**29,0 (6)**	**19,3 (7)**	**91 (6)**	**23 (5)**	**35 (3)**
Sweden	9,9 (6)	-	43,4 (3)	72,6 (1)	100 (1)	-	67 (1)
UK	11,8 (7)	-	56,1 (1)	50,1 (3)	93 (4)	18 (7)	51 (2)
France	15,6 (8)	24,3 (5)	50,2 (2)	32,1 (6)	63 (8)	24 (6)	13 (5)
Germany	23,3 (9)	-	40,0 (5)	36,8 (5)	90 (7)	-	26 (4)
Japan	-	21,4 (6)	-	-	49 (9)	69 (4)	-

Source: Dutch Ministry of Education, Culture and Science 2002, test date 2001.

In the Netherlands the number of pupils per computer in primary education has improved from 21.8 (1998) through to 17.9 (2000) and 8.4 in 2002. Other countries have also invested in access, so that on balance the Netherlands occupies the same mid-table position.[43] What strikes one is that, compared with other European primary schools, Dutch primary schools have an old stock of computers. Around 70% of the computers are more than three years old.

The number of Dutch primary schools connected to the Internet has grown spectacularly. In the 2000 benchmark the number was only 23%. By 2001 it had already risen to 91%. Since June 2002 all Dutch primary schools have in fact been connected to Kennisnet, the Dutch educational Internet platform (and therefore the Internet). Despite the significant growth in the number of computers and despite the large number of schools with an Internet connection, it has been found that relatively few computers (only 19%) are connected to the Internet.

Conclusion: Dutch primary schools have made up a large part of their absolute lost ground on the leaders in terms of computer and Internet access. Despite this, Dutch primary education is still in the middle bracket. A minus point is that the stock of computers is relatively old and only around one in five computers in the classroom is online.

42 For this table various sources were used, which are therefore not entirely comparable. The test date for Canada, Japan and Singapore is 1999. The number of computers in the US relates to all schools. For full details, see the underlying main report, "Surfers in the Delta, benchmark access and skills for the international ICT benchmark 2002" from Dialogic. There was no data available for Australia.

43 In this 2002 benchmark there is data for nine countries instead of six, as in the 2000 benchmark.

Table 18: Core figures on the infrastructure in secondary education[44]

	Number of pupils per computer		Computers more than 3 years old in %	Computers with Internet connection in %	Schools with Internet connection in %		Internal network in %
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2002 Benchmark	2002 Benchmark	2000 Benchmark	2002 Benchmark
US	4,2 (1)	7 (1)	-	-	100 (1)	93 (4)	-
Sweden	4,3 (2)	-	50,7 (5)	86,3 (2)	100 (1)	-	78 (2)
Singapore	5 (3)	8 (3)	-	-	100 (1)	100 (1)	-
UK	6,5 (4)	9 (4)	58,0 (1)	72,2 (3)	98 (6)	82 (5)	83 (1)
Canada	7 (5)	7,7 (2)	-	60 (5)	-	99 (2)	-
Finland	6,8 (6)	12,4 (5)	55,5 (3)	89,8 (1)	99 (5)	95 (3)	26 (6)
The Netherlands	**9,1 (7)**	**17,1 (6)**	**55,6 (2)**	**58,9 (6)**	**100 (1)**	**72 (6)**	**75 (3)**
France	9,5 (8)	25,1 (7)	54,7 (4)	44,0 (7)	97 (8)	55 (8)	55 (4)
Germany	14,1 (9)	-	46,9 (6)	62,4 (4)	98 (6)	-	52 (5)
Japan	-	36,2 (8)	-	-	68 en 80 (9)	58 (7)	-

Source: Dutch Ministry of Education, Culture and Science, 2002, test date 2001.

In secondary education, too, the number of pupils per computer has fallen considerably compared to the 2000 benchmark (from 17.1 to 9.1). Here too other countries have likewise made up lost ground, as a result of which the Netherlands still only lies in seventh position. In contrast to primary education the stock of computers in Dutch secondary education is relatively new. Around 55% of the computers are less than three years old. The number of computers in secondary education with an Internet connection is higher than in primary education. Yet in this area the Netherlands had nearly the lowest score out of the countries, for which information is available. The Netherlands has made up a significant amount of lost ground as far as Internet connections are concerned. All schools are now connected to the Internet. Japan is the only country trailing behind to any significant extent in this respect. Dutch schools are in the middle bracket with the number of internal networks.

Conclusion: secondary education has also made considerable progress in absolute terms, but despite this the Netherlands is still in the middle bracket. Internet access is considerably better than in primary education. The stock of computers is also more recent.

Other findings about ICT access in schools are:

- Professional and adult education in Netherlands (not included in the table) is in the absolute top of European countries based on the

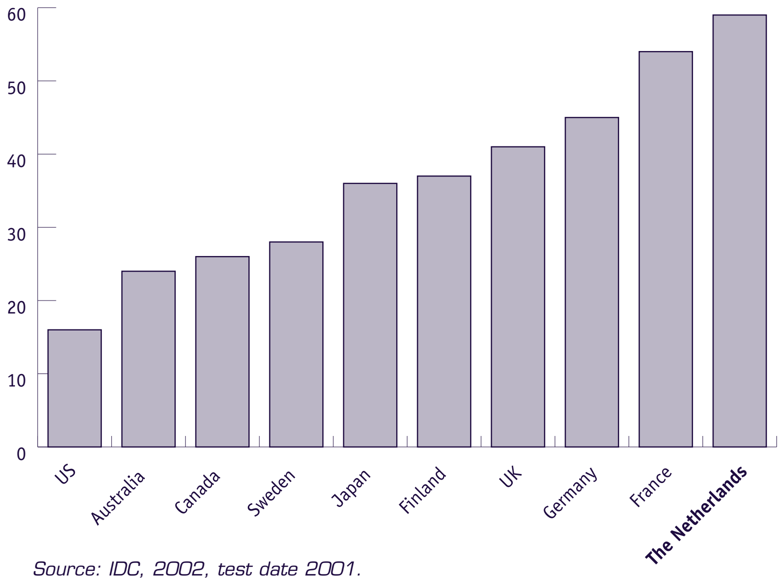
44 NB: the data from the 2000 benchmark only relates to the lower school in secondary education. Test date for Japan and Singapore is 1999. The test date for Canada is 2000 and only relates to the lower school. The Japanese figures on Internet connections relate to the lower and upper schools respectively. There was no data available for Australia.

same indicators (see tables 17 and 18);
- Compared with the European benchmark countries Dutch schools are the most likely to have an e-mail address (98%). Schools with their own website (47%) and an intranet (47%) put the Netherlands mid-table amongst the six European benchmark countries (fifth and third place respectively); [45]
- Dutch, Swedish and Finnish schools are more likely to have broadband Internet than other European schools. The Netherlands achieves a good score in that category mostly thanks to cable.

Public areas [46]

Public access points, e.g. on the street, in libraries, municipal halls and in community centres should increase access to the Internet for citizens.

Figure 13: Number of inhabitants per public Internet point



Source: IDC, 2002, test date 2001.

There is one public Internet point for every 59 Dutch citizens. This score puts the Netherlands at the bottom of all the benchmark countries (excluding Singapore). Comparatively speaking, the US has the most Internet points: one for every 16 inhabitants. What strikes one otherwise is that it is precisely those countries with a relatively high Internet penetration in households that also have a lot of public Internet points. Just because there is high Internet use at home most countries clearly don't see this as a reason not to create access elsewhere. The Netherlands is therefore an exception to this.

45 Source: European Commission, 2002, test date 2001.
46 The 2000 benchmark did not contain any figures relating to Internet access in public places.

Conclusion: the Netherlands is bringing up the rear with the number of public Internet points.

3.2.2 ICT skills and use

General

Just as in the 2000 benchmark there are relatively few internationally comparable indicators for skills, particularly as regards the home and the working environment. The number of country-specific studies on skills is increasing, but these are difficult to compare with each other and are predominantly qualitative in nature.

The number of websites per 1,000 inhabitants is a good indicator of actual Internet use. That actually says something about the intensity of use and the amount of content accessed via the Internet.[47] Table 19 includes the number of websites, the number of registered domain names and the number of secure servers.

Table 19: Number of registered domain names, websites and secure servers [48]

	Number of websites per 1.000 inhabitants		Number of registered domain names per 1.000 inhabitants	Number of secure servers per 100.000 inhabitants	
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2002 Benchmark	2000 Benchmark
US	46,1 (1)	27 (1)	37,1 (3)	32,5 (1)	17,0 (1)
Canada	24,8 (2)	7,5 (6)	25,3 (5)	19,8 (2)	8,7 (3)
UK	24,0 (3)	15,2 (2)	51,4 (1)	13,3 (5)	5,5 (5)
Germany	22,1 (4)	9,7 (3)	26,7 (4)	7,9 (7)	3,5 (7)
Sweden	19,0 (5)	8,5 (5)	21,6 (6)	14,5 (4)	7,1 (4)
The Netherlands	**17,2 (6)**	**9,1 (4)**	**39,0 (2)**	**6,9 (8)**	**2,9 (8)**
Australia	8,9 (7)	6,5 (7)	17,6 (7)	18,3 (3)	11,9 (2)
Finland	7,3 (8)	5,8 (8)	12,2 (8)	12,8 (6)	5,4 (6)
France	4,2 (9)	1,1 (9)	9,1 (9)	3,3 (10)	1,8 (9)
Japan	1,8 (10)	0,6 (10)	4,0 (10)	6,3 (9)	1,5 (10)

Sources: OECD, 2001a, (column 1), OECD, 2002, (column 3,4).

In comparison with the 2000 benchmark what strikes one is that the number of websites per 1,000 inhabitants in the Netherlands has nearly doubled, but that despite that the Netherlands has fallen two places

47 The figures as shown in the table have been adjusted, given that a number of sites cannot be traced to a particular country (for example .gov, .org).

48 There is no data available for Singapore. Test date for columns 1 and 3: July 2000, column 2: February 2000, column 4: July 2001 and column 5: March 2000. It must be pointed out that the time elapsed between the data for ICT 2000 benchmark and ICT 2002 benchmark is only four months. For some countries there was still substantial growth in this short period. Both measurements do, however, rely on the same organisation www.netcraft.com.

compared with the last benchmark. Canada has shown a sharp increase in comparison with February 2000.

The number of registered domain names is also an indicator of Internet use. The Netherlands' second place is notable, since the costs of registering a domain name in the Netherlands are relatively high.[49] A lot of domain names have therefore been registered in the Netherlands. That points towards intensive use.

One of the conditions for electronic purchasing of goods and services is the guarantee of a secure Internet environment. The number of secure servers is therefore shown in columns 4 and 5 of table 19. Just as in the 2000 benchmark the Netherlands scores low on this indicator in comparison with the benchmark countries.

Conclusion: the Netherlands has a relatively large number of registered domain names, is in the middle bracket with the number of websites and brings up the rear with the number of secure servers. Internet traffic is therefore comparatively unsafe.

ICT skills and use in the home environment

The number of people that bank online[50] can be an indicator of skills. Internet users only tend to bank online when they are more confident with the Internet and thus have more skills. In the Netherlands Internet banking is well developed. Both within Europe and beyond, the Netherlands is among the leaders. Roughly one in five households with the Internet banks online. Compared with the 2000 benchmark there has been a slight growth of three percentage points in the Netherlands. The penetration of Internet banking has increased in a number of other countries over the past few years. In the major European countries there is talk of stabilisation. In France there has even been a sharp decline[51] in Internet banking.

Home shopping via the computer is also a good indicator of Internet use. The figures in the first two columns of table 20 refer to Internet use for personal purposes, both at home and for example at work or at school.

49 In the Netherlands the costs of registering a domain name, measured over three years, is € 68.50. In the US it is free. In the Nordic countries it costs around € 30.00. Only Germany is more expensive than the Netherlands, at € 86.30. Source: OECD, 2001a.

50 In the 2000 benchmark we were still able to use three indicators from a survey by ProActive. This ProActive survey, however, was not repeated, and as a result these indicators have not been included in this benchmark.

51 In the French source it was noted that only 2% of French Internet users bank on the Internet. Presumably this is to do with a different method of measuring in the source, from the 2000 benchmark. In some studies a visit to a bank website is classed as Internet banking, while in other studies that is not the case.

Table 20: Internet use and online shoppers among the population aged 16 years and above

Country	Internet use among population 16 years and above in %		Share of online shoppers in %	
	2002 Benchmark	2000 Benchmark	2002 Benchmark	2000 Benchmark
Canada	60	-	18 (5)	-
Sweden [52]	58	-	29 (2)	-
US	57	58 (1)	33 (1)	27 (1)
The Netherlands	**52**	**46 (2)**	**18 (5)**	**12 (5)**
Australia	48	45 (3)	18 (5)	10 (6)
Singapore	48	30 (5)	9 (11)	5 (8)
Finland	45	-	17 (8)	-
Germany	36	28 (6)	28 (3)	17 (4)
UK	34	27 (7)	24 (4)	18 (3)
France	33	26 (8)	12 (10)	7 (7)
Japan	33	33 (4)	17 (8)	20 (2)

Source: NIPO, 2001, test date 2001.

From the above table it can be seen that the Netherlands occupies fourth position behind Canada, Sweden and the US. In the 2000 benchmark the Netherlands was still in second place. Internet use in the Netherlands has only increased slightly compared with the 2000 benchmark from 46% to 52%. In the US there was a fall. The percentage of online shoppers among Internet users is highest in the US (33%), followed by Sweden (29%) and Germany (28%). The Netherlands has remained in the middle bracket despite growth from 12 to 18 per cent.

Conclusion: Internet use in the Netherlands has only risen slightly, as a result of which the relative position has declined slightly. The Netherlands remains in the middle bracket with online shopping.

Other findings on the use of ICT are:

- The number of online-dropouts (users who stop online shopping after one visit) in the Netherlands proved to be better than expected at 15% (fourth out of eleven). Dropouts are found particularly in Japan and Australia. Germany and Japan have the most Internet users who intend to shop online;
- Of the European countries the Netherlands has the third highest per capita e-commerce turnover, at € 352. In Finland (€ 827) and Sweden (€ 602) per capita online spending is the highest;[53]

52 Statistics Sweden, 2001, test date 2001.

53 Source: Bundesregierung, 2002. In this survey, of the benchmark countries only Finland, Sweden, the Netherlands, the UK, Germany and France are included. There is a strong suspicion that in Australia, Canada and the US quite a lot of shopping is done online, in Japan and Singapore less so.

- On average the Dutch spend less time on the Internet per month than the population of most of the other benchmark countries (the Netherlands is eighth out of the eleven countries). The Dutch do however visit quite a few different sites (at 52 per month they are second out of eleven countries).

ICT skills and use in the working environment

According to the World Competitiveness Yearbook from IMD (2002) the Dutch workforce is awarded better than satisfactory (7.7) by its superiors in terms of the quality of ICT skills. This places the Dutch workforce behind Scandinavia and the US, but ahead of its major European neighbours. A good indicator of the extent to which businesses invest in the skills of their employees is the expenditure on ICT training. As shown in the section pillar B, 'know-how and innovation', (see table 11, page 39 of this benchmark) the Netherlands has one of the highest levels of per capita spending on ICT training after Sweden and the US. There is a big difference between these countries however. The Netherlands, along with Canada and Finland is among the runners-up. The major European countries, Japan and Australia score relatively badly.

As tele-banking is an indicator of skills among the population, so tele-working is an indicator of skills among the workforce. Tele-working also requires skills, because the staff member is using the computer and Internet independently from another location – mostly at home. Of the Dutch workforce one in ten is involved in tele-working. The Netherlands occupies third position (among the nine countries) along with Sweden, but the differences between them and the other countries are small. The US is the leader with approximately 20%. Most countries are around the ten per cent mark. Germany (4%) and Japan (3%) bring up the rear.

Table 21: Share of businesses with more than 10 staff members that use computer, Internet and their own website [54]

	Use of computers in %	Use of Internet in %	Use of own website in %	Use of CRM in %
Finland	98 (1)	91 (1)	60 (3)	9 (8)
Sweden	97 (2)	90 (2)	68 (1)	42 (2)
Germany	96 (3)	83 (3)	67 (2)	8 (9)
UK	92 (4)	63 (6)	50 (4)	15 (7)
The Netherlands	**88 (5)**	**65 (5)**	**35 (5)**	**62 (1)**
Australia	76 (6)	56 (7)	16 (7)	28 (5)
Canada	-	53 (8)	22 (6)	40 (3)
France	-	-	-	18 (6)
Japan	-	69 (4)	-	31 (4)
US	-	-	-	7 (10)

Sources: Eurostat, 2001, (column 1,2,3), IMD, 2002, (column 4).

The use of computers now has high penetration in the business sector. But with a score of 88% Netherlands is only in fifth place of a total of six countries. For Internet use the Netherlands scores 65% and also only manages fifth position (of eight countries). However, the gap between them and the leaders is a lot wider in this area. In the use of their own website the Netherlands, at 35%, is again in fifth place. Here too there is a wide gap between them and the leaders. In contrast the Netherlands is the leader by some margin in the use of 'customer relation management' (CRM)-software.

The following table takes a look at the share of companies that use the Internet for buying and selling products and services. The table gives a breakdown according to the size of company.

54 The figures for Australia, Canada and Japan relate to all businesses, not just those with more than 10 employees. The figures regarding use also relate to all businesses. For Canada the test date is 1999. For Australia and Japan the test date is 2000. For the other countries the test date is 2001. There is no data for Singapore.

Table 22: Share of companies that use the Internet for buying and selling products and services

	Purchasing in %			Sales in %		
	Total	SME (10-249)	Large enterprises (>249)	Total	SME(10-249)	Large enterprises (>249)
Germany	37 (1)	35 (1)	51 (1)	31 (1)	29 (1)	48 (1)
Finland	35 (2)	34 (2)	45 (3)	14 (6)	13 (4)	26 (3)
UK	33 (3)	32 (3)	50 (2)	16 (4)	16 (3)	35 (2)
Sweden	31 (4)	31 (4)	37 (4)	12 (5)	11 (5)	19 (4)
Australia	24 (5)	-	-	28 (2)	-	-
The Netherlands	**23 (6)**	**25 (5)**	**-**	**23 (3)**	**22 (2)**	**-**
Canada	20 (7)	-	-	8 (7)	-	-
France	10 (8)	-	-	-	-	-
Japan	9 (9)	-	-	-	-	-

Source: Eurostat, 2001.

The SME in the Netherlands is at the bottom of the list in online purchasing in Europe, but if we look at the total number of companies that purchase online, the Netherlands is still ahead of Canada, France and Japan. With online sales of 22% the Dutch SME is a European leader. In the 2000 benchmark, at only 8%, it was only just above the EU average of 7%. Among the total companies the Netherlands is now well in the running, in third place.[55]

So, Dutch companies sell slightly more via the Internet than they buy. That does not mean that there is a full range of transaction options on their websites. Only 1% of all Dutch companies offer payment options via the Internet (see table 8, page 36). This low score is remarkable. Nevertheless, the Netherlands is not far behind with e-commerce. Moreover almost every country gets a low score. Australia and the US score highest, with 10%. Evidently therefore there are still lots of viable alternative payment options.

Conclusion: the use of computers in businesses has now penetrated to a great extent. This is less true of the use of the Internet and the use of the company's own website. There is a wide gap between them and the leaders. The Internet is used quite a lot as a sales channel, less so for purchasing.

55 If all electronic networks are taken into consideration, as they are by the CBS, including even those networks that are not based on Internet technology such as EDI, then the Dutch business sector is the leader in Europe. See CBS, 2002a, p. 121.

ICT skills and in the educational environment [56]

The number of teachers with computer training in the Netherlands is not particularly high in comparison with the other countries. The Netherlands does slightly better on Internet training, despite a lower percentage of computer training courses.

Table 23: Percentage of teachers with computer or Internet training[57]

	Computer training in %	Internet training in %	No training in %
Finland	76 (1)	56 (1)	24 (1)
UK	74 (2)	56 (1)	24 (1)
Japan	66[58] (3)	-	-
Sweden	62 (4)	35 (4)	35 (3)
The Netherlands	**62 (5)**	**52 (3)**	**35 (3)**
France	44 (6)	29 (5)	53 (5)
Germany	35 (7)	22 (6)	63 (6)

Source: Dutch Ministry of Education, Culture and Science, 2002, test date 2001.

Slightly more than half of Dutch teachers have had Internet training. As a result the Netherlands is in third place behind Finland and the UK. Roughly a third of the teachers have had no computer or Internet training. This puts the Netherlands in the middle bracket of the European countries. In Germany and France a large group of the teaching population has had no computer or Internet training. This is linked to the fact that access to the Internet and use of ICT in French and German schools is also less than in other countries.

Conclusion: six out of ten Dutch teachers have received computer training. The score in terms of Internet training is slightly better, at 52%.

The share of ICT students in higher education is another indicator of skills in the school environment. This subject has already been covered in pillar B, 'know-how and innovation' (see table 12, page 40 of this benchmark).

A comparison of the use of computers and the Internet at school by teachers in the various countries and in different types of education produces a changeable picture. The following table shows the share of teachers that use online computers at school for educational purposes. It gives a breakdown by type of education.

56 There is no comprehensive international comparison for the 2002 benchmark like there was two years ago as part of the SITES studies. In the 2000 benchmark this SITES data was able to be used.
57 The source used (Dutch Ministry of Education, Culture and Science, 2002) does not make a distinction between primary and secondary education. Higher education and universities are not included.
58 Statistics Bureau & Center Japan, 2001, does not make a distinction between primary and secondary education. Higher education and universities are not included. The indicator reads: "number of teachers that can use a computer".

Table 24: Share of teachers that use online computers in education.

	Primary education in %	Secondary education in %	Vocational education in %	All schools in %
Finland	78 (1)	73 (1)	63 (2)	77 (1)
UK	56 (2)	58 (3)	-	57 (3)
Sweden	54 (3)	67 (2)	40 (4)	65 (2)
US [59]	45 en 56 (4)	47 en 44 (4)	-	45 en 53 (4)
The Netherlands	**34 (5)**	**40 (5)**	**69 (1)**	**37 (5)**
France	27 (6)	33 (6)	38 (5)	32 (6)
Germany	12 (7)	31 (7)	41 (3)	29 (7)

Source: European Commission, 2002, test date 2001.

There are marked differences between both the type of education and the countries. The Netherlands is among the leaders as far as online use in vocational education is concerned, while we lag behind in primary and secondary education. Remarkably low (only 12%) is the share of teachers in Germany that use online computers in education. It has already been established that computer and Internet penetration in German schools is very low. Finland is a clear leader with 78% and 73% in primary and secondary education. Taking the school system as a whole the Netherlands is in the rearguard – it is fifth out of the seven leaders. Apart from that the Netherlands has actually made up lost ground compared with the previous benchmark. In primary education, for example, Internet use in the previous benchmark was 25% compared with the current 34%.

Comparable conclusions can be drawn in the offline use of computers in education. There are big differences between the countries and between the different types of education. The scores are higher on average, though. In primary education for example the number of teachers using offline computers in education varies between 37% (Germany) and 100% (UK). When we look at the average offline use in all schools the Netherlands does better than it does in online use. With 90% the Netherlands is in third place (out of six benchmark countries). The principal reason for this is the good score in primary education (second position with 96%) and in vocational education (first with 88%). Lost ground was made up here too. In 1998 computer usage in primary education was 49% (now 90%)[60] and in the first stage of secondary education 74%. In the 2000 benchmark the Netherlands was still lagging behind, particularly in primary education. The recent figures give the impression that the Netherlands has made up this lost ground in primary education.

59 National Center for Education Statistics, 2001a, 2001b, test date 1999, split into special and public education.

60 Primary education also includes special education. There is therefore interference in this comparison, but the upward trend is certain.

Conclusion: the Netherlands is only fifth out of the seven European leaders in the online use of computers. The Netherlands scores slightly better for offline use.

Other findings regarding use in an educational environment are:

- On average, Dutch teachers use offline computers on a weekly basis a lot longer on than they do online computers. In the offline use of computers Dutch teachers are second out of the European countries. In online computer use they are fourth;
- Dutch teachers have integrated computers well into areas other than ICT. 90% of them use the computer for educational purposes in 'non-ICT subjects' (third place out of the six European countries). The Internet is less well integrated (in fourth place out of the six European countries, with 37%);
- Dutch teachers that do not use the Internet tend to cite as the principal reason the fact that the classroom doesn't have an Internet connection (48%). Among the European countries that is the highest score. Dutch teachers cite reasons like 'no computer at school' and 'I don't know how to use the Internet' less often than many of their European colleagues.

Public areas

The Netherlands has relatively few public Internet points, but their use is comparatively high. The percentage of the population that uses public Internet locations is highest in Finland and Sweden. In Japan it is only three per cent. With thirteen per cent the Netherlands is in fourth place.[61]

The question is whether high Internet use in public places is a good sign or not. High use of public Internet points may mean that less of the population has an Internet connection at home. The high use of public Internet locations and the high Internet penetration in households in Sweden and Finland contradicts that. It seems that plenty of access and use of the Internet in public places give an indication of the extent to which ICT has penetrated and is integrated into society.

61 This data is taken from IDC, 2002.

4 Pillar D: Regulatory aspects

4.1 Overall position

4.1.1 International harmonisation

A significant part of ICT regulation is prepared or directed internationally. This sometimes happens on a global scale, for example copyright and tax aspects of electronic commerce. However, the European level is far more important. Nearly all the issues discussed below are tackled in an EU context. In actual fact there are more and more community regulations for issues that do not fall under the authority of the EC, such as criminal law.

That does not mean that harmonisation is being achieved everywhere at EU level. The compromises that many directives necessarily contain are interpreted differently at national level – consciously or unconsciously. Sometimes legislation is consciously left to the member states. The harmonisation of views on jurisdiction in an international context in particular remains a thorny problem. In the field of criminal law the question of when a state can exercise jurisdiction (for example if investigation is being carried out 'elsewhere' via the Internet) is not answered in the Convention on Cyber-crime. In the field of civil law it has not yet proved possible to reach agreement on jurisdiction in relation to the Internet within the Hague Conference on Private International Law.

4.1.2 Self-regulation, co-regulation and government regulation

With the exception of France the countries surveyed are still paying lip service to a preference for self-regulation. Nevertheless government regulation on nearly all issues appears to predominate in practice. The amount of EC directives and federal legislation in the US and Canada bears testimony to this. The reason for this legislation is not so much a failure in self-regulation, but rather a need for legal certainty (especially in the business sector) or for harmonisation at a federal or supranational level.

Sometimes self-regulation is contextualised in government regulation; this is then a matter of co-regulation. Compliance with self-regulation can then be enforced (for example the monitoring of Trusted Third Parties in the Netherlands and the UK). Another form of co-regulation is the involvement of 'the market' in the substantiation of government legislation. This form occurs for example when organising electronic government. In contrast to the first form of co-regulation mentioned, the second form seems to occur increasingly often.

4.1.3 Position of the various countries

Viewed globally the differences between the five EU member states surveyed (UK, Germany, France, Sweden and the Netherlands) are not that marked. ICT regulation in the US differs from that in the EU on a number of points, whereas Canada is now closer to the US and then closer to Europe. Japan has comparable regulation in some areas, but not in others.

Nevertheless, it appears that there are indeed differences within the EU when we look at it in detail, not just in the extent of self-regulation or co-regulation, but also in the approach to ICT regulation. With the WES (1998)[62] and IRIM (2000)[63] policy documents the Netherlands was the first country with a co-ordinating analysis and view of ICT regulation. Recently the UK has done something similar, but less extensively. In France a more co-ordinating regulation broke down with the dissolvement of parliament. In the US, Canada and Japan, too, less attention has been paid to an integrated view than in the Netherlands.

On the other hand concrete legislation in the Netherlands is often effected later than in other EU member states. The Netherlands is running somewhat behind in the implementation of directives in the field of ICT. The UK in particular often elects for rapid implementation, in order to create legal certainty early and thus create an attractive climate for new electronic commerce.

The position of the US differs from that of the EU in two respects. On the one hand the US leaves regulation in some areas (for example privacy and spam) entirely to the market, whereas from the point of view of legal protection the EU chooses government regulation. On the other hand, in a number of areas the US has more detailed legislation than the EU, often due to a need for legal certainty in the business sector, for example in the field of electronic payment systems.

In addition in the US more attention is paid to new ICT developments (for example electronic agents), that have not penetrated EU regulation. The attention paid to new threats seems greater in the US than in the EU. This is true of identity fraud, privacy of children on the Internet and supervising Internet communications interception for example.

62 Memo "Legiseation for the Electronic Highway", Lower House, conference year 1997-1998, 25 880, nos. 1-2.
63 Memo "Internationalisation and Law for the information Society", letter from the Minister of Justice dated 18 May 2000, parliamentary documents II, 25 880, no.10.

4.2 Support

4.2.1 General legislation and regulations

Electronic contracts

The European directive on electronic commerce[64] requires member states to specifically recognise electronic agreements. Most member states currently have laws (Germany, France) or bills (the Netherlands) to implement this part of the directive. In the US and Canada too there is (model) state legislation, in which the electronic agreement is recognised as a legal form of contracting.

One difference between the two continents is the recognition of new forms of electronic contracting, for example the use of 'electronic agents'. The US and Canada are clearly further advanced in this respect. The US in particular stands out with the Uniform Computer Information Transactions Act (UCITA). This model law contains a full substantive legal scheme of transactions with information products.

Conclusion: electronic contracts can now legally be concluded everywhere. However, with a full substantive legal scheme and recognising agents the US and Canada are further ahead than Europe in the general regulation of electronic contracts.

Liability of Internet service providers (ISPs)

In Europe the civil and criminal liability of ISPs is harmonised by the directive on electronic commerce. Most civil-law implementation (Germany, the Netherlands, UK and Sweden) fits in closely with the regulation in the directive. France however has clearly adapted it to France Law. The criminal law implementation is considerably less homogenous. There can certainly be no talk of harmonisation in this area.

There is a noticeable difference between the European and American approach to liability. Europe has chosen a general, integrated approach, while the US and Canada have a more ad hoc approach, with various regulations that only tackle certain unlawful acts. In comparison, the US with the 'notice-and-take-down-regulation'[65] has a generally applicable procedure for removing unlawful material from the Internet, unlike the EU. This appears to benefit legal certainty. The Japanese approach seems more like the European than the American approach.

64 Directive 2000/31/EC, OJEC 2000, L178/1.

65 These regulations were set out in the 'Digital Millennium Copyright Act' (DMCA) of 1998. Under the terms of the DMCA ISPs are able to limit the financial damages they may be fined because of unlawful actions by their users, subscribers and account holders.

Conclusion: the civil liability of ISPs is harmonised by the directive on electronic commerce. However, there is no question of criminal law harmonisation. The EU and Japan have a more integrated arrangement than the US and Canada, which only provide for liability for certain types of unlawful behaviour. Unlike the US Europe has no legal procedure for removing unlawful material from the Internet.

4.2.2 Legal certainty

Privacy on the Internet

The Directive on data protection still dominates the policy initiatives on privacy in the EU. The Netherlands, France and Germany were very late in implementing this directive. In the Netherlands the directive norms have only been partially specified in the Personal Data Protection Act (Wbp). The Netherlands does not differ fundamentally in this from other member states. Canada has less far-reaching federal legislation in the area of privacy (limited to commercial situations), but according to EU norms it does have an appropriate level of protection. In Japan the sectoral privacy legislation has been found too wanting; proposed legislation for a new privacy law has been drafted.

Government regulation and self-regulation is also increasing in the protection of privacy. In the US self-regulation of the protection of privacy was always a starting point, but goverment regulation is increasing, as is shown by a recommendation from the Federal Trade Commission and the draft ‘Hollings Online Personal Privacy Act’. The EU has observed that there are still shortcomings in compliance with self-regulation in the US via the ‘Safe Harbour Principles’ – which must bridge the differences in approach between the US and the EU. For the time being the EU sees these as teething problems. Apart from that, the US pays more attention to the government regulation of privacy of children on the Internet than the European countries.

Conclusion: in the EU the Directive on data protection has been implemented in most countries. In the US self-regulation in privacy does indeed still predominate, but some government regulation is now in sight.

Enforcement of intellectual property rights

The enforcement of intellectual property rights on the Internet is primarily controlled internationally, via the Convention on Trade Related Intellectual Property Rights (TRIPs) and conventions of the World Intellectual Property Organization (WIPO). Within the EU this is also done via implementation of the copyright directive of May 2001. Germany is leading the implementation. The Netherlands held a comprehensive social consultation first.

On a global level there are various initiatives to protect producers of information services in the digital environment. However, it is not proving easy to reach agreement on the substance of the protection. In national implementation it is proving difficult to apply new and existing rules of intellectual property to the digital environment. Experiences in the US show that it is difficult to find a good balance between the interests of producers and those of consumers.

The development of a Community patent is progressing only slowly.[66] For the ICT sector protection of computer inplemented inventions (software) and business methods is of great importance. However, this protection must not stand in the way of innovation and healthy competition. It is not proving easy to find the right balance on this point either. That will not speed up the acceptance of the proposed Directive on software patents.[67] In the US and in Japan software patenting is possible.

Conclusion: the enforcement of intellectual property rights on the Internet is primarily controlled internationally, but in national implementation is not proving easy to apply to new developments. In the EU there are less opportunities for obtaining a patent on software than in the US and Japan.

Computer crime

At the end of 2001 the Council of Europe's convention on cyber-crime was concluded. This convention enables cross-border computer crime to be tackled. Harmonisation ('approximation') of substantive terms and mutual assistance terms and the setting up of a 24/7-network represent a significant step forwards. The convention also has its restrictions. Content-related offences fall outside it, for instance. The convention does not provide any progress in the area of conflicts in jurisdiction. On some points Canada and the US are more advanced than the European countries. Identity fraud and offering illegal services online are punishable there, for instance.

66 Proposal for a regulation from the Council on the Community Patent, 5 July 2000, COM (2000) 412.

67 Proposal for a directive from the European Parliament and the Council on the patentability of inventions implemented in computers, 20 February 2002, COM (2002) 92 def.

Self-regulation also plays a part in tackling computer crime, for example via hotlines for harmful or unlawful content. The Netherlands was and is a leader in this field. With the exception of Canada the other countries now also have hotlines. In some countries (US, France) these are actively supported by the government.

Conclusion: internationally, lost ground has been made up with the Convention on Cyber-crime. The Netherlands had a very active role in drafting this convention. Self-regulation in the fight against crime via hotlines is still on the increase. The Netherlands continues to be among the leaders in this.

The fight against terrorism

The attacks of 11 September 2001 led to a big influx of policy and regulation initiatives. With the exception of Japan and Sweden all the countries surveyed have proposed and/or adopted legislation in response to the attacks. The Netherlands has launched a large-scale plan of action in the fight against terrorism.

Not all the legislative initiatives from this plan are that new, for that matter. Various measures had been proposed earlier, but proceedings were accelerated by 11 September. In the ICT sector the following measures are important in the fight against terrorism:
- increase in information exchange between security services and police (EU, Germany, the Netherlands)
- strengthening of identification possibilities (Germany, the Netherlands, UK)
- development of DNA databases (US, Canada)
- securing of networks and infrastructures (EU, the Netherlands, US)

Furthermore, what strikes one in particular is that powers to investigate telecommunications are being extended.

In general the measures are not so sweeping as to discourage electronic commerce. What is clear is that there is greater opportunity to infringe civil liberties than previously.

Conclusion: with the exception of Japan and Sweden all the countries have implemented or proposed sweeping (legal) measures in the fight against terrorism in the wake of 11 September 2001.

4.2.3 Tax regimes

Direct and consumer taxes

In the area of direct taxes and electronic commerce the role of the OECD since 2000 has only grown. In general the opinions of the OECD tally with those of the Netherlands, Canada, Japan and Sweden. It's a different story for Germany, France, the UK and the US. The differences in taxation can lead to interference in competition. The differing position of the UK is the most pronounced, given their viewpoint that a 'stand alone server' does not represent a 'fixed organisation'. As a result the UK may be a more attractive country for the location of a 'stand alone server' than the Netherlands, for example.

As far as consumer taxes are concerned the Netherlands is bound to the EU rulings in that area. The new Directive on VAT and electronic commerce[68] only targets consumer transactions (roughly 10% of the market). The position of Canada does not differ significantly from that of the EU. The position of Japan is still not clear. The consequence of the EU directive is that American entrepreneurs are going to lose their competitive advantage. The position of EU-based providers of electronic services is strengthened by the creation of a level playing field.

Conclusion: the OECD sets the tone for direct taxes, but some countries (the UK in particular) depart from this. For consumer taxes a new European directive takes away the competitive disadvantage compared with the US.

Fiscal stimulation of ICT applications

The Netherlands has active fiscal stimulation of ICT applications. Canada, France, Germany and the US do not have this fiscal stimulation. Fiscal stimulation occurs to a limited extent in Sweden. Japan and the UK in particular have considerable fiscal measures. The depreciation and tax discounts there are able to compete with the Dutch schemes. For the UK this development fits in with their ambition to be the best country for electronic commerce.

Conclusion: in the UK ICT applications have increasing fiscal stimulation. The Netherlands is more active than Japan and certainly more so than Sweden. The other countries do not operate an active policy of stimulation.

68 Directive 2002/38/EC from the Council dated 7 May 2002, OJEC 15 May 2002, L128/41.

4.2.4 Increasing consumer and market confidence

Electronic signatures

All countries surveyed now have legislation on electronic signatures. The requirements imposed on the technology for electronic signatures vary. In Japan these are principally aimed at the technology for digital signatures. In the US and Canada in principle any technology can be used for electronic signatures. The EU directive on electronic signatures[69] is a hybrid. The directive combines the open approach to electronic signatures in the general sense with a stricter approach to qualified electronic signatures (evidential value). The object of the directive is harmonisation. Nevertheless there are differences in legislation within the EU, for example in the supervision of issuers of non-qualified certificates.

Conclusion: in the EU the regulation of electronic signatures is harmonised to a great extent, but there are national differences in implementation. The EU operates the same open approach as the US and Canada in some respects, but also has applied extra protection to certain technologies for electronic signatures.

Electronic payment and financial services

The member states of the EU are working on the implementation of the Directive on institutions for electronic money.[70] The Netherlands is implementing it differently from Germany, the UK and Sweden for example.

The US has chosen a different approach from the EU. Instead of treating electronic money as a separate category, electronic money is treated in the same way as other alternative payment methods. Thus American legislation harmonises a greater range of payment systems. In addition the US is concentrating more on the transactions themselves than on the type of institutions that carry out these transactions.

Finally, a proposal has been drafted for an EU directive on distance selling of financial services.[71] The objective is to arrange consumer protection for this type of selling. The proposal is awaiting decision-making by the Council.

Conclusion: the Netherlands has a different approach to the implementation of the directive on institutions for electronic money. In Europe the emphasis lies particularly on the regulation of institutions, in the US on the regulation of transactions. A proposal has been drafted for an EU directive for the distance selling of financial services. The aim of this is to offer consumer protection.

69 Directive 1999/93/EC, OJEC 2000, L13.
70 Directive 2000/46/EC, OJEC 2000, L275.
71 COM (1998) 468 def., OJEC 1998, C385.

Trusted Third Parties

The term 'Trusted Third Party' is becoming obsolete. Now we tend to talk of certification service providers (CSPs). In addition there are providers of confidentiality services. The Netherlands, France and the UK are aiming to tackle both categories in an integrated fashion. The other countries are restricting themselves to the CSPs. For France statutory regulation is the starting point. The Netherlands and the UK are aiming for conditioned self-regulation. Japan has a comprehensive regulation for the accreditation of CSPs. Canada and the US do not have any specific regulations on this point. Part of the reason for this is that their legislation regarding electronic signatures is not inspired by cryptographic signatures.

Conclusion: only in France there is statutory regulation of confidentiality service providers. The regulation of (supervision of) CSPs varies in the EU, except in the compulsory supervision of providers of qualified certificates.

Cryptography

The Wassenaar Regulations[72] give international direction to the export (restrictions) of cryptography for the most part. Virtually all countries, including the Netherlands, have implemented the agreement in their national legislation. In the past few years the national regulations have been growing increasingly close to each other.

The domestic regulation of cryptography is chiefly a national matter. International harmonisation could not be reached on this point. Nevertheless these regulations also seem to be growing closer to each other. Most countries restrict themselves to a statutory 'duty of decryption'. That means that in the interests of law enforcement or national security the government can insist on encrypted information being decrypted or a code being handed over. The Netherlands was the first country to introduce a duty of decryption, although on a small scale. France and the UK have a more drastic regulation.

The problems concerning domestic crypto-regulation have for a long time constituted legal uncertainty about the admissibility of cryptography use. Now that the countries have restricted themselves to a duty of decryption there seems to be no further hindrance to the use of cryptography for the security of electronic commerce.

Conclusion: the internationally driven export restrictions to cryptography in the various countries have grown closer together. With the domestic regulation of cryptography the worldwide trend is that governments are

72 An international instrument that regulates the export of weapons and goods for dual use (for both military and civilian purposes).

restricting themselves to a statutory duty of decryption. As a result the legal uncertainty surrounding the admissibility of cryptography use has disappeared to a great extent.

Commercial communication and spam

As far as commercial communication and spam (unsolicited commercial e-mail) are concerned most countries have an opt-out system via a statutory regulation or through self-regulation. That means that electronic advertising is permitted, unless the consumer has objected. In the Netherlands there is currently an opt-out regime, with several guarantees being laid down by law. It is doubtful whether the Swedish regime can be considered as an opt-in system (electronic advertising is permitted, provided the consumer has given their consent), given that this decision is left to the courts.

The directive on privacy in the electronic communication sector[73] obliges the member states of the EU to change the opt-out approach for unsolicited commercial communication to an opt-in regime before October 2003. But there is a subtle distinction in the main rule. Companies may, for example, approach their existing customers via unsolicited e-mails.

In the US and Canada there is no regulation of unsolicited commercial e-mail at a federal level. Almost half of the US states do have regulation, which in general tend towards opt-out. The interests of the direct marketing industry carry more weight in North America than they do in Europe.

Conclusion: most European countries have a (sometimes statutorily guaranteed) opt-out regulation for unsolicited commercial e-mail. With the recent European directive on privacy in the electronic communication sector an opt-in system will come into force in Europe. In the US and Canada there is less sympathy for the consumer. In these places regulation of an opt-out nature has the upper hand.

Codes of conduct and quality marks for electronic commerce

Codes of conduct and quality marks can contribute to trust in electronic commerce. In most countries self-regulation has been opted for on this point. Pending government regulation, codes of conduct play a part in the creation of legal certainty for consumers. With increasing government regulation, professional codes of conduct provide us with a transition from regulation to practice. The Netherlands has played a pioneering role in the area of codes of conduct with the Model Code of Conduct from ECP.nl, the Electronic Commerce Platform Netherlands.[74]

73 Directive 2002/58/EC, OJEC 2002, L 201/37.
74 Model code of conduct for electronic commerce (October 2001).

Quality marks are important for the visibility of compliance with minimum norms. In Canada and the US in particular quality marks have been created from pure self-regulation. In Europe quality marks in general receive more support from the government, via financing, imposition of quality requirements, certification or the recommendation of reliable quality marks. The number of quality marks has grown considerably in recent times. The risk with this is that quality marks will lose their reputation and power of expression. It has already been noticed abroad that the rise of fake quality marks is muddying the waters where the effectiveness of quality marks is concerned.

Conclusion: in most countries codes of conduct and quality marks have been created for electronic commerce – in particular via self-regulation. In Europe these are supported by the government more than in the US or Canada. There is a very strong growth in (fake) quality marks on the Internet, which may influence consumer protection negatively.

Online dispute resolution (ODR)

Online dispute resolution is still in the pioneer phase. Arbitration institutions are cautiously beginning to provide an opportunity for ODR. The EU directive on electronic commerce stipulates that there must be no legal obstacles to alternative dispute resolution or the use of ICT therein.

The Netherlands has taken the first step with ODR.nl, set up under the auspices of the Electronic Commerce Platform Netherlands (ECP.nl).[75]
The UK and the US are already more advanced. There, there are initiatives for online dispute resolution, with certain regular legal procedures being executed online.

(Partial) ODR is already being used on a significant scale in domain name disputes. Besides the ‘Uniform Dispute Resolution Policy’ of the ‘Internet Corporation for Assigned Names and Numbers (ICANN)’ there are already procedures in force or being worked on for many national domain names. The US and the UK have got furthest with this, followed by Canada and the Netherlands.

Conclusion: ODR is in the pioneer phase. The Netherlands is certainly not lagging behind in the various initiatives. The US and the UK are clearly further on, with initiatives for ODR for regular legal cases. That is also the case for the resolution of domain name disputes, where ODR is already taking place on a significant scale.

75 See www.odr.nl.

Jurisdiction and applicable law in private law disputes

This subject throws up a lot of questions in relation to international electronic commerce. The provider has an interest in legal certainty, the consumer in protection. The contrast between these interests does not look like being resolved in an international context for the time being. Within the OECD and the Hague Conference for Private International Law there has been scarcely any progress or none at all. Opinions voiced in a smaller context (such as the EU) cannot always count on agreement in wider circles.

In tort situations, problems of private international law play an even greater role. This issue is extremely difficult to tackle on an international level, partly due to big cultural differences and divergent interests.

With a lack of legal initiatives companies and consumers will have to be content with technical and organisational measures for the time being. Parties will therefore be able to exchange information about home and business addresses and the content of the applicable law. Using this they will at least be able to make an informed choice for cross-border contracting. In the case of tort, however, there will be little benefit from technical and organisational solutions.

Conclusion: the regulation of jurisdiction and applicable law is problematic in international electronic commerce. In an international context little progress has been made in the harmonisation of national regulations. In contractual relations technical and organisational measures partly soften the blow.

5 Pillar E: ICT in the public sector

5.1 Overall position

There is little comparative source material on electronic government. International surveys restrict themselves to the provision of electronic services. Nevertheless, in order to give a full picture, the output from various sources has been pieced together where possible. Solid figures are therefore missing, but the benchmark gives a good indication. The indicative scores are represented by 'radar charts'.

The aim of this part of benchmark has changed slightly compared to the 2000 benchmark. In the survey for the 2002 benchmark data was compiled on the following six topics[76] (angles) of electronic government:

- Policy and administration
- Conditions
- Service provision to citizens
- Service provision to businesses
- Internal functioning of the government
- E-democracy

The Netherlands is not among the global leaders in ICT in the public sector. This does not alter the fact that the target, for at least 25% of the total public service provision to be carried out electronically by the end of 2002, was reached at the end of 2001. All benchmark countries have developed policy in the area of e-government. The fact that the Netherlands started relatively quickly has not given it a leading position. The picture from the previous ICT benchmark remains unchanged as a result.

The Netherlands scores above average among the benchmark countries on service provision to the citizen and e-democracy. On the other topics this country scores below average.

Countries like Canada, Singapore, the US and Australia and – closer to home – Finland and Sweden represent a clear, broad leading group. In these countries interaction and transactions via channels like the Internet are increasingly possible, while the Netherlands still tends use its Internet sites to provide information. In Finland and to a lesser extent in Sweden the link between front office and back office is well designed, with clear standardisation agreements, functioning databases as 'foundation' to service provision, electronic signatures, and even pro-active service provision in a few places.

76 These six topics are to be classified under the three areas of consideration in De Digitale Delta, i.e.: improvement of service provision for citizens and businesses, improvement of the internal functioning of the government by means of ICT and giving more perceptible substance to the role and (example) function of the government as a player on the ICT market.

5.2 Support

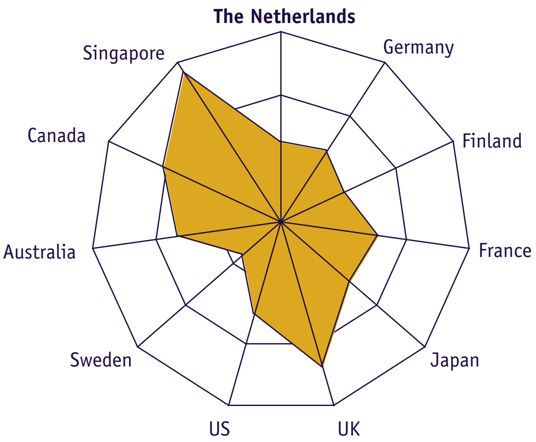
5.2.1 Policy and administration

In the topic 'Policy and administration' we looked at:
- the formulated aims and the pace at which they are being reached
- policy spending on programs aimed at electronic government
- management and the manner in which policy and adjacent topics (like public-private co-operation) are organised

The Netherlands scores below average on this topic. That was also the case two years ago. Even back then it was established that most countries in the leading group had set up special government-wide organisations or appointed officers to reach the targets of e-government.

Recently the Netherlands has indeed put a lot more effort into the management of electronic government. This is evidenced for example in the setting up of the ICTU[77] and the creation of various management committees. However, co-operation is mainly on a voluntarily basis, not based on an explicit mandate that fits in with the prevailing administration culture.

Figure 14: Policy and Administration[78]



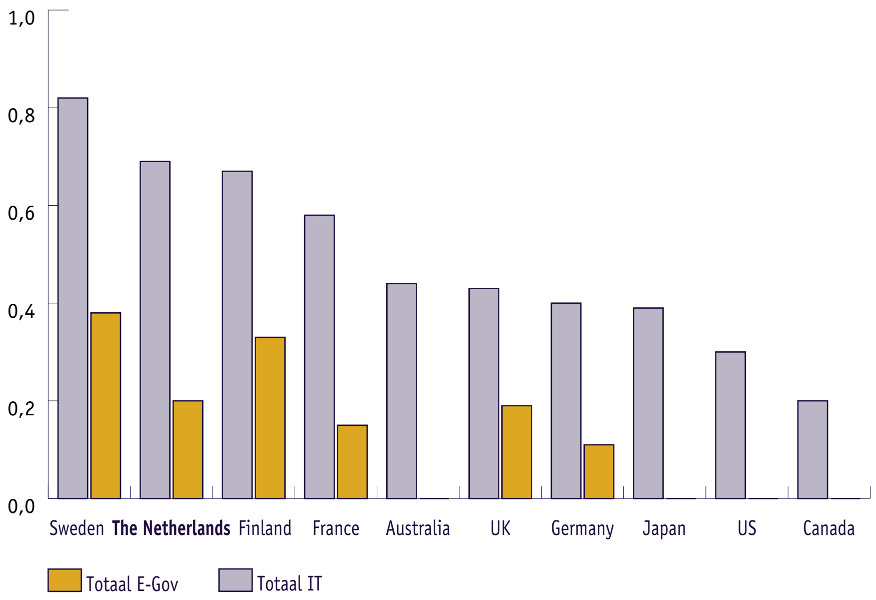
Source: Dialogic, Zenc and M&I Argitek, 2002.

77 ICTU is responsible for organising ICT implementation and has been set up to realise government aims in the ICT field.
78 Each country is assessed on each indicator on a five-point scale. The radar charts always show a sum of the scores on the separate indicators, by topic. This allows the positions between the countries by topic to be seen at a glance.

One positive aspect is that policy in the Netherlands is directed at the full breadth of electronic government. Various aspects such as public access, participation and service provision are receiving attention. In other countries targets are generally only formulated in terms of the provision of services. Across the board there is little attention paid to use or effects of use (impact).

Another positive point is that the Netherlands has set a measurable target for electronic service provision, which it has also reached. The Dutch target applies to various levels of government. In most other countries the policy is mainly directed at national (or comparable) level.

Figure 15: Spending on IT and e-government as % off GNP



Source: Dialogic, Zenc and M&I Argitek, 2002.

There is no unambiguous comparable data on spending on electronic government. It is therefore difficult to give a good indication of it. Based on the ratio between overall ICT spending and specific budgets for electronic government the spending in this country appears to lag behind other countries, such as Sweden and Finland (see figure 15).

Administration and management vary considerably in the different countries. In the Netherlands the Ministry of the Interior co-ordinates initiatives in the field of electronic government. This takes into account the autonomy of the other management layers and the independence of other ministries. In the UK and in France co-ordination is a matter for the Offices of the Prime Minister ('E-envoy' and 'Commissariat du Plan' respectively). In Canada and Finland the Ministry of Finance drives the initiatives. It seems that countries with a strong management or co-ordination function are having more progress in the field of standardisation and infrastructure.

Finally, we looked at public-private co-operation in e-government. In Anglo-Saxon countries and in Singapore in particular this co-operation has developed rapidly. In the US for example government portals are completely subcontracted to companies. The other countries – including the Netherlands – are generally more reticent.

Conclusion: the Netherlands scores below average on policy and administration. Compared to the 2000 benchmark this picture hasn't really changed. Spending on electronic government also appears to lag behind other countries.

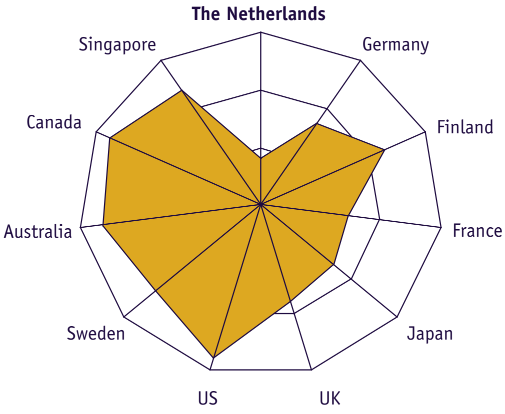
5.2.2 Conditions

In the topic of 'Conditions' we looked at:
- Internet penetration
- Electronic identification
- Privacy
- Government presence on the Internet

These aspects have been included in this survey because they are of interest to the development of electronic government. They mainly deal with matters such as access, the confidence of citizens in electronic government and the opportunity for reliable communication with the government.

Among the test countries the Netherlands scores below average on conditions.

Figure 16: Conditions



Source: Dialogic, Zenc and M&I Argitek, 2002.

In the 2000 benchmark only Public Key Infrastructure (PKI) was looked at in the conditions. The conclusion then was that the Netherlands was bringing up the rear. On this specific point it still lags behind.[79]

One of the Netherlands' strengths is the high Internet penetration in households. The same is true of the penetration among businesses, even if the differences between the benchmark countries are smaller here. The high Internet penetration offers enormous potential for the development of electronic government. The demand from society may stimulate the provision of electronic services. In addition the direct relevance of electronic service provision is greater because the user figures are very probably higher.

A number of matters regarding electronic identification have not yet been settled. Firstly, at the time of the survey the legislation for electronic signatures had not yet been adopted.[80] In almost all other countries it already has. Secondly, there is no central government-rated 'Certification Authority'. This is an organisation that, as the highest place authority in the hierarchy, gives other authorities the power to issue certificates for electronic signatures. There are other countries that have not sorted this out yet (France, US and Sweden).

Finally the Netherlands does not have a unique business registration number. US, Canada, Sweden and Finland already do. When these matters have been sorted out, front office service provision in particular will need to be linked to these infrastructural facilities. On that point the other countries are not yet far advanced either, for that matter. There is not much current data on the presence of governments on the Internet.

79 Political decision-making on translating European directives into national legislation still needs to take place.
80 The bill in question is being processed by the Upper House.

The Netherlands seems – particularly at a local level – to have begun to develop a broad range of government websites later than other countries. Considerable lost ground has now been made up.

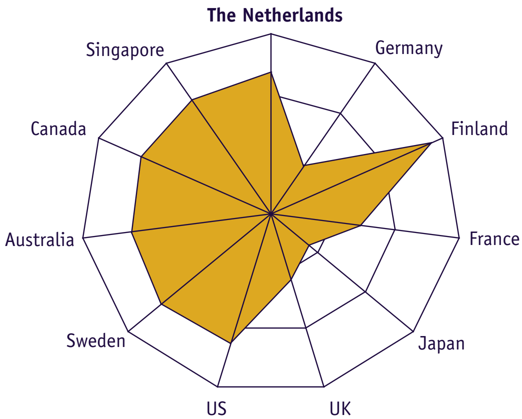
Conclusion: the Netherlands scores below average among the benchmark countries on the topic of conditions.

5.2.3 Service provision to citizens

In most international e-government comparisons only electronic service provision is looked at. The provision of electronic services on the Internet is key. In addition no distinction is made according to the relative importance of these services. The use of alternative channels (like EDI) is also not taken into account nor is the extent to which services are already provided pro-actively (such as child benefit in the Netherlands).

In this benchmark more consideration is given to additional aspects, such as the use and integration of services. A number of specific services were looked at: tax return, registration of births, vehicle registration and change of address. This shows that the Netherlands scores well on the subject of service provision to citizens. The Netherlands is one of the leaders, alongside countries like Singapore, Finland, Sweden and Canada.

Figure 17: Service provision to citizens



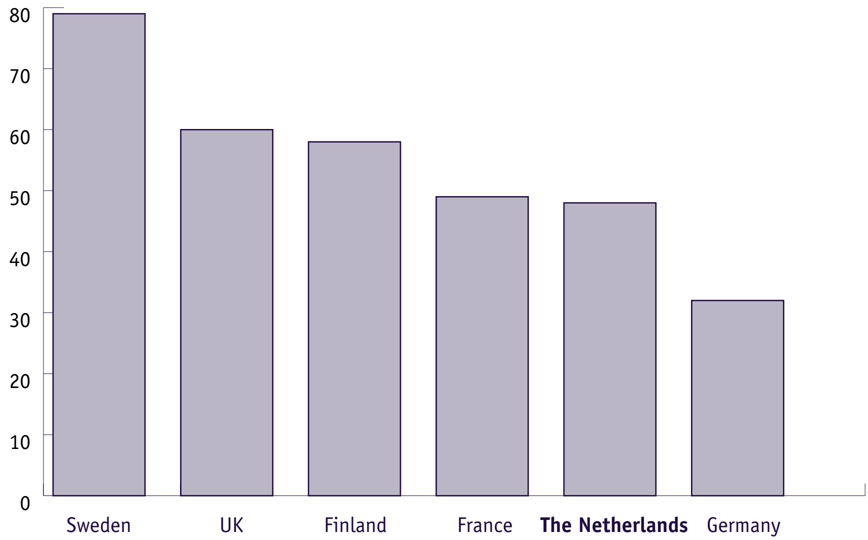
Source: Dialogic, Zenc and M&I Argitek, 2002.

Comparison with the 2000 benchmark is difficult because a more precise distinction is now being made between service provision to the citizen and service provision to the business sector, and because additional aspects are looked at. Two years ago the Dutch experience with actual interactive electronic service provision was found to be limited to a number of authorities at national level and a number of large municipalities. That is still the case. Moreover there is still a considerable difference in the extent of electronic service provision between national and other government levels. Steady progress can be deduced from national measurements.
The issue of the municipal product catalogue in particular has brought interactive service provision within reach of municipalities. Yet electronic service provision is also developing constantly in other countries.

Canada: lost wallet (canada.gc.ca/cdns/wallet)
Lost wallet is a service for citizens that was set up as a result of a life event or problem. If you lose your wallet (or if it's stolen) you can report it to several places at once via a central point, say you lose your ID card, your passport, senior citizen's pass, driving licence and health card at the same time. This facility specialises in just this sort of situation: the bringing together of services, information and links from all sorts of (potentially relevant) government organisations.

One of the Netherlands' strengths is its use of government information and services. This bears a relation to the high Internet penetration. The Netherlands stands out on income tax in particular: with 70% of returns done electronically the Netherlands is a leader. In the assessment this counts heavily because it is a high-frequency service that is of interest to a lot of citizens. Another strength is the surveying of citizens' opinions. Aside from the question of what is actually done with these opinions, it can be an enormous incentive for the renewal and improvement of service provision.

Figure 18: Electronic service provision to citizens



Source: Cap Gemini Ernst & Young, 2002.

The Netherlands' weaknesses are the availability of the provision of electronic services (see figure 18) and the extent of the interaction of these services. This is also shown in the benchmark from the European Commission.[81] As already set forth at the beginning of this paragraph, a better picture emerges if we look at other aspects of electronic service provision.

Conclusion: the Netherlands scores well on the topic of service provision to citizens. One example is electronic income tax returns.

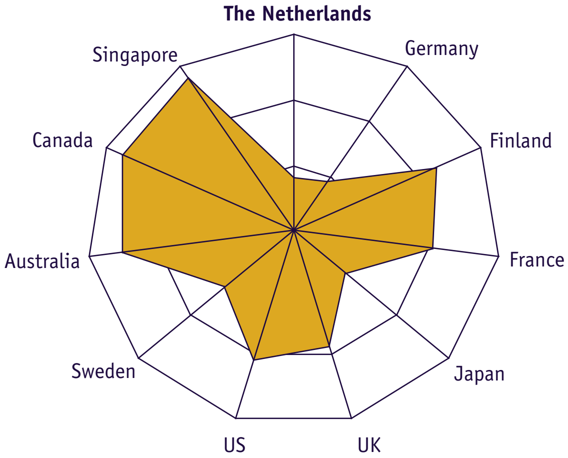
5.2.4 Service provision to businesses

In the topic on 'Service provision to businesses' we looked at range, extent of interaction and use for a number of specific services (VAT returns, customs declarations and e-procurement). The presence of a one-stop-shop for business is also included in the analysis.

Although the Netherlands may be a leader in service provision to its citizens, in service provision to businesses this country clearly lags behind. This is notable because in many countries it is precisely service provision to businesses that has priority. The expectation is that there is more interaction there and therefore more 'profit' to gain.

81 Source: Cap Gemini Ernst & Young, 2001 and Cap Gemini Ernst & Young, 2002.

figure 19: Service provision to businesses



Source: Dialogic, Zenc and M&I Argitek, 2002.

One of the Netherlands' strengths is electronic customs declaration for import and export. Previously this was done by electronic EDI solutions. Recently - through integration of electronic data interchange – this has been done using the Internet. In most countries they are in the process of switching over to Internet systems.

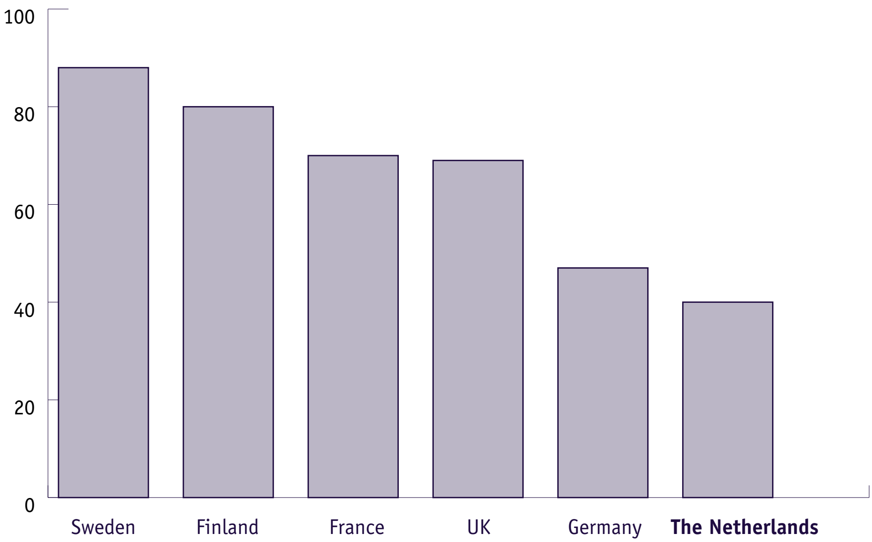
Finland: 'Broker service' for accounting reports (www.tyvi.org)
Businesses can use the TYVI-system to send electronic accounting reports (such as taxes, social insurance contributions etc.) to government institutions. TYVI also has modules that can automatically search ERP and HRM packages, generate the necessary information and then send it electronically to the authority responsible. No people are involved. Four commercial brokers manage the network. Companies pay a fee to the broker. The government pays the broker based on the volume of data generated. Approximately 50,000 businesses use TYVI.

In terms of specific services electronic VAT returns and e-procurement are under-developed. This means that the Netherlands also achieves a low score in the benchmark of the European Commission. In the Netherlands it is not possible at present to submit electronic VAT returns via the Internet. This leaves the Netherlands, together with Japan, lagging behind other countries. But work is currently in progress in the Netherlands on an electronic solution in the form of integrated data interchange and web forms.

As far as e-procurement is concerned each department has its own approach at a national level. An action plan should ensure a combined approach. In addition, work on an electronic market place is also under way.

Another weakness is the lack of a national one-stop-shop for business. This is still in the pilot phase in the Netherlands. In other countries integrated electronic service provision to businesses has already been operational for quite a while.

Figure 20: Electronic service provision to businesses



Source: Cap Gemini Ernst & Young, 2002.

Australia: Business Entry Point (business.gov.au)
This is the single point of entry for businesses in their interaction with the government. Using the Australian Business Number (ABN) links with business information in back offices of government organisations are possible. A next step is the Business Authentication Framework-project (BAF), which is intended as a mid-office solution for all government organisations with businesses as customers. This way, government organisations can share information with each other and collaborate in their service provision. The one-stop-shop for business for example provides the following services:
- *applying for a business number*
- *applying for permits*
- *e-procurement: tenders and contracts*
- *the transaction manager*

This last facility is a resource to support business interaction with authorities at all three levels (various government layers). A business will get its own page where all the information entered is saved for later use.

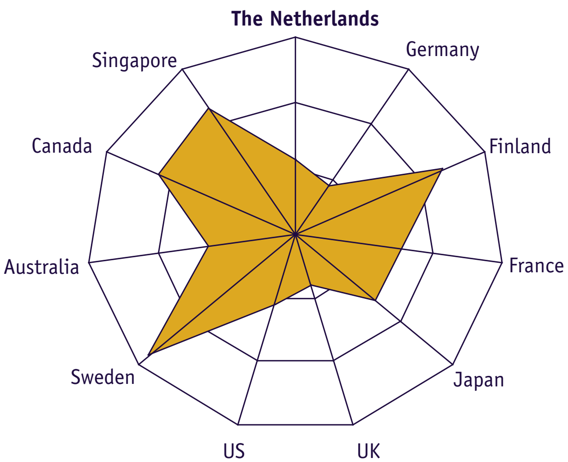
Conclusion: the Netherlands is a clearly lagging behind on the topic of service provision to businesses. Electronic VAT returns and e-procurement are still relatively under-developed.

5.2.5 Internal functioning of the government

For the internal functioning of the government we looked at:
- The presence of a central portal
- Electronic forms
- Intranet between authorities
- Authentic registrations
- Secure data interchange
- Standardisation

In the 2000 benchmark the Netherlands was a solid average performer on this topic. In the 2002 benchmark new indicators were used. The Netherlands now scores below average on the internal functioning of the government.

Figure 21: Internal functioning of the government



Source: Dialogic, Zenc and M&I Argitek, 2002.

One of its strengths is the policy aimed at authentic registries (program for Streamlining of Basic Information). A number of registries are well developed in the Netherlands (for example the GBA, the municipal personal records database). The positive effects of this are visible in the quality of the service provision. On this point the Netherlands is still behind Sweden and Finland. There, databases have been common knowledge for a long time. Moreover in Sweden and Finland the exchange of information between government organisations is easier thanks to the use of a unique identifying personal number. We don't have that in the Netherlands.

One of the weaknesses is the fact that there is no central policy for standardisation (as with XML for example). Within the government there are no central arrangements that are monitored by a single authority; in the field of technical standards, standardisation of terms and semantics, communication protocols etc. standardisation is arranged by government domain. That makes exchange between government institutions difficult.

In the area of open standards Australia, Canada and the UK appear to be leading with their 'Interoperability Framework'. In the other countries there are no central facilities for electronic forms. This may be seen as a weakness, but in some countries it is no more than window dressing, with attention being paid to the link with the back office.

Finally each country now has a central government portal, with links to the various government organisations. Levels of ambition and functionalities differ greatly, in terms of, say, the underlying information and services, question and answer-based access to information, search options and interactivity. Life events are the motive underlying the development of more and more websites.

Singapore: ECitizen portal (ecitizen.gov.sg)
The Ecitizen portal is the central access point for government service provision to citizens. The portal has a gateway to life events and fourteen 'towns'. The towns are responsible for topics such as health, housing and the like. Behind the portal are 540 e-services from around 54 government organisations.

Conclusion: on the point of internal functioning of the government the Netherlands has fallen from a solid average performance to below average.

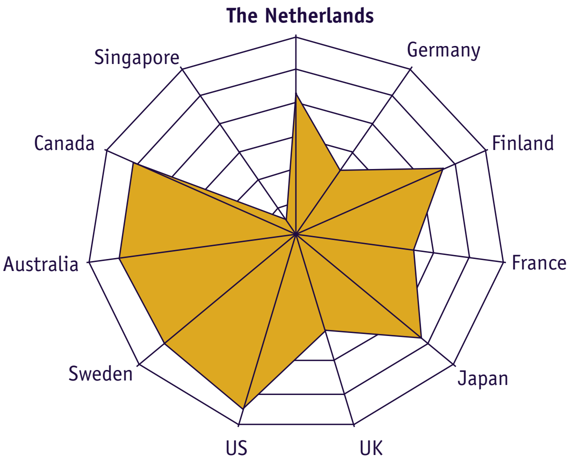
5.2.6 E-democracy

In E-democracy we looked at:

- Starting points in policy on public access to government information
- Parliamentarians with a website
- Interactive policy-making
- Access to legislation and policy information

The Netherlands scores above average on e-democracy.

Figure 22: E-democracy



Source: Dialogic, Zenc and M&I Argitek, 2002.

Compared with two years ago there has been no significant shift in position on e-democracy compared with the other countries. The conclusion from the 2000 benchmark was, “In the Netherlands as abroad a start has been made on consulting citizens in policy-making”. It is also stated (but not in a comparative sense) that the Dutch government makes good use of the Internet to make information accessible. The current conclusion is that the Netherlands scores above average on e-democracy.

One of the strengths of the Netherlands’ position is the amount of attention paid to public access of government information. The Netherlands has formulated an explicit policy intention: that by the end of 2005 100% of the public authorities will meet the minimum guidelines for democratic basic information. This means that regulations from the various authorities and documents from the representative organs (such as Provincial Council, Municipal Council, Water Board Management) will be accessible via the Internet.

Public access to information is not as strongly anchored in the Dutch administration culture as in Sweden, but nor do we have a tradition of reticence like they do in France and Germany. The actual transparency should become evident from the extent to which the government actively makes information available electronically.

All basic legislation is now available on the Internet. That is also the case in most other countries, but the Netherlands has arranged its availability and (free) accessibility quite well.

Another strength is that the Netherlands is actively making a start on interaction via the Internet. Canada and the UK also place a lot of emphasis on a 'responsive' government. In the Netherlands substance has been given to this by the setting up of an expertise centre (Xpin) and the provision of subsidies to municipalities and provinces. Canada has set up a 'guideline for online consultation'. There, there is also more consultation in departments.

A minus point in the Netherlands is the small number of parliamentarians with their own website. A website can be used to spread a political message via an additional media channel or to get feedback. In the US the use of this is now widely appreciated. Only France scores lower than the Netherlands on this point.

Table 25: Number of parliamentarians with a personal homepage

Country	Absolute numbers	Percentage
US	435/435	(100 %)
Finland	178/200	(89 %)
Japan	375/500	(71 %)
Germany	437/666	(66 %)
Sweden	226/349	(65 %)
Australia	92/150	(61 %)
UK	258/659	(39 %)
The Netherlands	**37/150**	**(25 %)**
France	54/577	(9 %)

Source: Dialogic, Zenc and M&I Argitek, 2002.

Conclusion: just as in the 2000 benchmark the Netherlands scores above average on e-democracy.

Appendix 1

List of abbreviations

(A)DSL	(Asymmetric) Digital Subscriber Line
BNP	Gross National Product
CBS	Centraal Bureau voor de Statistiek (Statistics Netherlands)
CPS	Carrier (pre-)selection
CRM	Customer Relation Management
DVB-T	Digital Video Broadcasting-Terrestrial
ECP.NL	Electronic Commerce Platform Nederland
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
EU	European Union
FTE	Full-Time Equivalent
GBA	Gemeentelijke Basisadministratie persoonsgegevens (Municipal Personal Records Database)
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
HRM	Human Resource Management
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ITU	International Telecommunication Union
ODR	Online Dispute Regulation
OECD	Organisation for Economic Co-operation and Development
OPTA	Onafhankelijke Post en Telecommunicatie Autoriteit (Independent Post and Telecommunications Authority)
OSS	Open Source Software
PKI	Public Key Infrastructure
PSTN	Public Switched Telephone Network
R&D	Research & Development
SSL	Secure Socket Layer
T-DAB	Digital Audio Broadcasting-Terrestrial
TFP	Total factor productivity
UMTS	Universal Mobile Telecommunications System
UK	United Kingdom
US	United States of America
WLAN	Wireless Local Area Network
WLL	Wireless Local Loop
XML	Extensible Markup Language

Appendix 2

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Colophon

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