NÆRINGS- OG HANDELSDEPARTEMENTET

e-norway

Status Report June 2003

e-norway

june 2003

The Government presented its IT policy plan, *e*Norway 2005, in May 2002. The plan describes Norwegian IT policy targets and five essential areas of commitment.

We pledged ourselves in eNorway 2005 to presenting regular status reports on IT development. This status report, the second in succession, presents statistics and figures through which a qualified evaluation of IT trends in Norway may be inferred.

Even though the dotcom bubble has now definitely burst, developments in IT have by no means ground to a halt – neither in Norway nor abroad. Norway is a global leader in IT accessibility, even if a number of international surveys conclude that Norway is losing ground in terms of exploiting IT to its full potential, which is the impetus for drawing up an eNorway Strategy and subsequent Status Reports. These reports are designed to explain where we want to go and where we stand today, as well as to inspire us to work harder.

A status report such as this should therefore be regarded as a working document aimed at generating high levels of activity. In many aspects, we have a good point of departure – but the real challenge here is transforming these advantages into tangible gain.

The report contains a new feature: in-depth focus on a specific area of commitment, and this status report takes a detailed look at the education sector this time. Over the past four years, the sector has received more than NOK 1 billion in government funding to boost IT education. What has this achieved? We will take a closer look at how the money has been spent, at where things stand today and which goals we have for the way ahead. The report also features an article written by the Norwegian Minister of Education and Research, Kristin Clemet, on the future direction of IT education, and an article penned by Professor Sigmund Lieberg on some of the challenges facing us now. Although we commissioned Professor Lieberg to write the article, his opinions are his own!

As a link within the eNorway Plan, the Government has established an ePartner scheme, aimed at promoting collaboration and encouraging an open exchange of ideas between private-sector and government institutions, all with a constructive role to play in shaping the eNorway of the future.

We have received invaluable contributions in this respect, such as from Abelia, which underlines the need to foster more innovation in Norwegian industry, The Norwegian Confederation of Business and Industry [NHO], which focuses on the significance of IT as the driving force behind innovation in small businesses. And eForum raises the issue of consumer rights. A number of these contributions are included in this report, although they represent the companies' own opinions. However, these reflect aspects of the proposals and comments supplied along the road to bringing eNorway to fruition.

Oslo, 23 June 2003

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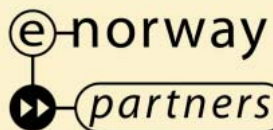
e-norway partners

The ePartner scheme is designed to promote collaboration and the exchange of ideas between enterprises involved in shaping the future of eNorway — private-sector and government institutions which radiate energy and are a source of inspiration for others in the process of creating a digital knowledge society for everyone. The ePartners consist of the following:

Abelia
Alta municipality
BankID collaboration
Brønnøysund Register Centre
Datakortet as
eForum
ICT Norway
IT CoE, in Halden
LiNK
National Council for Norwegian Children's and Young People's Organisations [Landsrådet for Norways barne- og ungdomsorganisasjoner]
NorStella
Senior Citizens' Network [Seniornett]
The Norwegian Computer Society
The Norwegian Confederation of Business and Industry [NHO]
The Norwegian Farmers' and Smallholders' Association [Norsk Bonde- og småbrukerlag]
The Norwegian Labour Directorate (Aetat)
The Norwegian Mapping Authority [Statens kartverk]
The Norwegian University of Science and Technology [NTNU]
Årdalsnett AS

Contents

In comparison with other European countries, Norway enjoys a strong position in many areas of IT development.

Norway's domestic market is small with numerous small enterprises posing major challenges in terms of the level of skills necessary to deploy the new technologies. Building such a complex infrastructure in a country with vast distances between the north and south is a huge task. But we are still left with the impression of not always managing to reap the potential rewards from calculated application of technology.

1. A good framework for eNorway

⪢ - Electronic and traditional communications are predominantly on an equal legal footing
- IT-intense industry is enjoying sound growth in productivity.

▸ - IT export companies are experiencing a healthy rate of research activity
- Industry has good access to technology.

■ - Less use of new information technology in business than in competitive countries, e.g. e-Business
- Lower investment levels of research both in industry and the public sector in comparison with the Nordic countries.

Considerable effort has been poured into modifying regulations to ensure that traditional and electronic forms of communication are predominantly equal in legal terms. Looking ahead, it will be important to make sure that both industry and the general public are aware of these amendments.

There is every indication that IT impacts the economy from a macroeconomic perspective. During the 1990s, the growth in productivity for mainland Norway's economy was on a par with the US. Growth was particularly high within private provision of services such as commodity trading and domestic transport. The same is presumed true of the banking and insurance industries. Deployment of new technology is one of the main reasons for this growth. However, much of the wealth generated by IT in the form of cost savings and improved services is difficult to account for statistically.

Many consumers shop online. However, the proportion of Norwegian companies that have sold goods or services online is lower than in comparable countries. This could be due to a lack of skills and a diffuse industry structure.

The vast majority of exported IT goods are delivered electronically, although the sales process is hardly ever carried out entirely online, partly because of the demanding nature of sales work. Norwegian IT companies are typically either firmly entrenched within their local neighbourhood or else they are global companies. The degree of R&D work and level of skills are crucial factors that affect an IT company's export and competitive capabilities. Export-oriented IT companies have kept their research competitive, although the overall investment in R&D for IT remains lower than in other Nordic countries. Traditional

trade barriers have less impact nowadays, in fact, than investment barriers and technical trade barriers.

Following five years of teleliberalisation, most niche markets are still dominated by Telenor, although the number of competitors

2. Accessibility and security

⪢ Good access to an electronic infrastructure

▸ - Broadband roll-out is increasing
- Many security measures have been initiated, but some unresolved problems remain.
- Access to infrastructure varies according to geographical location.

■ - Many niche industries are experiencing problems with the present competitive situation, although this appears to be improving
- Increased – but continued low-scale – use of electronic signatures.

is steadily increasing. Industry has certainly gained much from teleliberalisation, although the impact on regional Norway and low-income groups is still uncertain. Phone calls are cheaper, but subscription charges are more expensive.

After getting off to a slow start, the broadband market has been making marked progress, but there are still regional variations in service and quality. 25 per cent of Norwegian households connected to the Internet are expected to have broadband soon. For local authorities, libraries and schools connected to the Internet, the situation varies but seems to be improving. Most health enterprises and institutions have broadband connection and the health-care Internet provider, Helsenett. Norway has lower coverage and higher prices for broadband than the other Nordic countries. However, there are fewer differences than in the past.

As in many other countries, the process of introducing electronic signatures is progressing more slowly than expected. There are only two e-signature providers currently on the market, although there are a number of users. In May, Rikstrygdeverket [the National Insurance Service], launched a national roll-out of PKI-based e-signatures for the health sector.

It takes time for security concerns to become second-nature. The overall outlook as regards security threats has remained quite stable, in spite of a more unstable world situation. Consumers have more problems tackling viruses than companies do. Academic institutions, with authentication schemes and training in IT security, are either in place or are about to be launched. The Government approved a national strategy for IT security in May.

3. Skills for change

⇉	- Norwegian schools are well equipped, particularly at sixth-form level.
▸	- Norwegian pupils spend less time on IT than in other Nordic countries. - Good levels of education in pure IT, although other basic subjects and a drop in applications lowers standards. - Skills in IT, organisation and e-Business operation are not adequately developed everywhere yet.
■	- Disparities in IT skills levels, particularly linked to age, but also to gender and geography.

During the past four years, the Government has invested more than a billion Norwegian kroner in IT in the education system. This is in addition to local investment. Vast sums have been poured into boosting IT skills for teachers, educational facilitation and R&D projects. We are at the forefront of developments providing pupils with access to IT, particularly at sixth-form level. There is still much room for development as regards the number of PCs at elementary schools. An increase in schools' IT efforts is crucial, particularly for children who have no Internet access at home.

IT deployment is generally high within the Norwegian population, although there are disparities in gender, age and geographic regions. Such variations are often linked to ability, skills and the willingness to deploy these technologies.

4. Attractive content

⇉	- Rapid growth in commercial advertising - Broader choice of languages - Active user groups for Norwegian content - SMS content services still under development
▸	- Many popular Norwegian content services, but low production of unique digital content
■	- The content market is dominated by a few major players - Children are exposed to undesired content - Undesired e-mail (spam) is becoming a problem

There is much demand for electronic content, although there is limited production of unique electronic content. The main focus of the market is still on wrapping existing content digitally. The Norwegian content market is dominated by a few, well-established media houses. Despite that fact, there is a good variety of languages.

The electronic content market has grown. More micro payment solutions have been developed, although the usage level remains uncertain. The media's revenue base is increasingly derived from the sale of electronic services, particularly from banner adverts. Online advertising shows strongest growth in the largest media and is on the verge of becoming the fourth largest advertising medium after television, daily newspapers and weekly magazines. Government agencies are important content providers.

Reports on children's use of the Internet reveals wide discrepancies between children's actual use of the Internet and their parents' misguided impressions.

Many children have seen pornography or violence on the Internet, or have been asked if they would like to meet people they have only met in chat rooms.

Undesired mass spam e-mails still present a growing problem.

5. A modern public sector

⇉	- Specific high-profile projects - People request electronic services - Basic interactive services are generally widespread
▸	- Making many peoples everyday life simpler - Many enterprises are providing better services
■	- Few enterprises have integrated services - Electronic procurement is still in its infancy - Electronic services do not reach frequent and demanding users

There is tremendous potential for making the public sector's task-solving more efficient through electronic solutions. There are countless examples of good IT initiatives, although progress has been slower than expected. International rankings show that Norway is no longer at the cutting edge of developments. Only seven government agencies and three local authorities are able to offer fully-integrated electronic services. Most have developed simple interactive services, and many of these can provide more advanced services tailored to individual needs.

More widespread initiatives such as reporting data to government agencies (AltInn) and the establishment of a national health network could improve matters. Electronic submission of tax assessments show that new user services make life simpler and boost efficiency. To what degree the public sector will be able to reap the benefits from introducing electronic services remains unclear, even though the public is ready for new services to a large extent. Public procurement is still in the initial phase. There are still issues to resolve as to how to reach less resourceful users. A new strategy for IT in the public sector was presented in February.

*e*Norway 2005 was first presented in May 2002 and contains the Government's general IT policy for the coming years. The Government has formulated three primary targets for its IT policy:
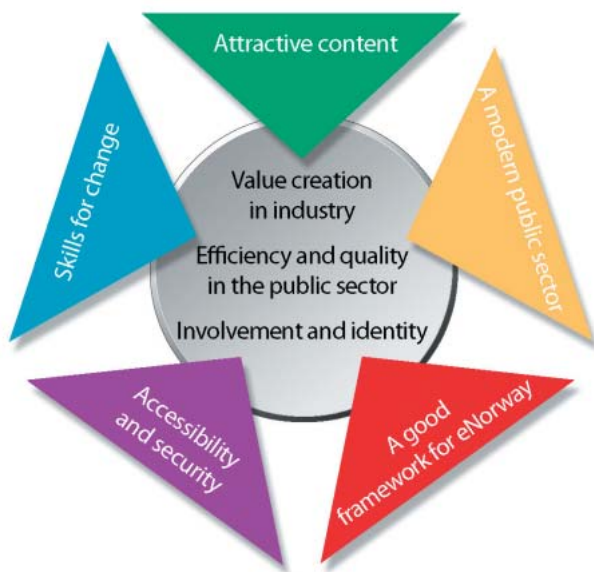
Creating value in industry
The expansion and use of information technology shall help create value through enhanced innovation and competitiveness in Norwegian industry.

Efficiency and quality in the public sector
Information technology shall be used to make the public sector more efficient and to offer new and improved services to users.

Involvement and identity
Everyone shall be able to benefit from the potential of information technology, and IT shall play a role in preserving and promoting our heritage, identity and language. eNorway 2005 is directing its attention towards achieving its primary goals (centre of the figure below):

systems. As progressively more areas of society are starting to deploy electronic systems, the need for access is becoming more essential parallel to rigorous tightening of security requirements.

Skills constitute a critical prerequisite for deploying IT technology – whether by industry, the public sector or private individuals. This concerns both technical expertise and user skills. The Government must do its part to guarantee access to a skilled workforce.

The Government will encourage increased access to **attractive content**, localised to Norwegian conditions. Public sector electronic content shall be more user-friendly and easier to access. The Government is also obligated to digitize Norway's national heritage and make it more easily accessible. It will also help combat illegal and harmful content

IT deployment constitutes a key asset in the creation of a **modern public sector**, one that is both cost-effective and capable of providing new and improved services. The Government's role is as a key market player, capable of vitalizing development and demands for IT-related products and services.

The Government shall establish **good framework conditions for eNorway** by keeping its regulations up-to-date, providing good financial schemes and facilitating IT innovation and research. The framework shall not favour any one particular technology, and the Government shall do its utmost to engender thriving competition.

A further key requirement involves **accessibility and security** in information systems, services and the Internet. The Government shall be a driving force in broadband roll-out and the introduction of electronic signatures. This also includes encouraging free competition among telecom providers, ensuring access to basic telecom services throughout Norway, and securing information

Targets:

- *Electronic and traditional services shall be placed on an equal footing, and regulations shall remove any obstacles impeding electronic communication.*
- *A framework shall be put in place for exploiting the potential for value creation by means of full IT implentation.*
- *A good framework shall boost the use of electronic commerce in and between enterprises.*
- *IT shall be given high priority in the intensification of Norwegian research, and the ensuing results shall be commercialised as far as possible.*

REGULATIONS TO ACCOMMODATE DEVELOPMENTS

The "eRegulation Project" *[eRegelprosjektet]* has enabled the Government to review regulations to remove any legal obstacles to electronic communication. The project has yielded the desired results. A report from Agderforskning[1] points out that the major "legal obstacle" at present is unfamiliarity with amendments to legislation governing electronic commerce. The eRegulation Project has been concluded and is now being mappped by the VideRe Project under the auspices of the Ministry of Trade and Industry. The Project has a special e-mail address for reporting any impediments to electronic communication.[2]

Amendments are constantly being made. to regulations|, e.g. relating to copyright and access to government data. However, discriminating legislation is prevalent in certain areas, and other framework conditions, all of which adversely affect the competitiveness of electronic publications. No complete list is available of the extent of and impact of this kind of difference in treatment.

With reference to incorporating the EU's Directive on copyright in the Information Society[3] in the Norwegian Act on intellectual property rights, the Ministry of Culture and Church Affairs has suggested extending the wording to include simple clarification on the scope of the Act on intellectual property rights (agreement concession) to apply within the area of digital media. A similar procedure has also been proposed for the re-use of protected material from the Norwegian Broadcasting Corporation archives. The right to copy material solely for private use will be maintained, but any reproduction must be carried out in a manner deemed not unreasonable with regard to the copyright holder. The Directive also demands that it be made illegal to break an electronic seal in order to copy the material. This prohibition will not, however, inhibit normal use of electronic equipment.

A key element in improving the government's role as an information provider will be to secure harmonised regulations on access to public informasjon, including pricing in this instance. One aspect of this means that initiatives prompted by the recently presented White Paper on map and geodata.[4] Implementation of the forthcoming EU Directive on public information will call for a fundamental review of regulations within this field.

Technology and market trends have revealed the need to update and change the wording in current Norwegian regulations on electronic communication, including here the Act on telecommunications, and will encompass the entire area of electronic communication. A new act on electronic communications will come into effect on 25 July 2003, and will yield the means necessary to strengthen competition and reassure Norwegian industry that the regulations have been harmonised with the EU Member States' legislation.

As far as the general implementation of EU regulations is concerned, Norway ranked second on the ESA's scoreboard in May 2003.[5] We have delayed implementation of 0.7 per cent of the EU's legal acts, and thereby meet the EU's target of lying under 1.5 per cent. Only Denmark is higher on the list. This is an improvement from fourth place and a 1.0 per cent delayed implementation in November 2002.

IT AS A BASIS FOR VALUE CREATION

Predictions for the global economy's growth rate are even lower this year than previously anticipated. Unemployment is escalating in many countries. The Norwegian economy has suffered from weaker trends than forecast before in the Norwegian National Budget for 2003. Falls in competitive expenditure have been partly the cause of losing market shares in Norway and abroad.

There is every reason to believe that investments in IT have had an impact on the economy, which is also noticeable from a macroeconomic perspective. The OECD calculated that Norway experienced growth in the total factor productivity (TFP)[6] on a par with the US during the latter part of the 1990s. The USA was singled out during the same period as a country where intensified IT deployment was a factor in boosting productivity. According to the latest productivity calculations from Statistics Norway, trends within private sector service provision, particularly within commodity trading and domestic transport, are responsible for a rise in the TFP growth in mainland Norway over the past decade.

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[1] "Electronic commerce – Obstacles and Action", Agderforskning, December 2002.
[2] Obstacles can be reported to the following e-mail address: videreprosjektet@nhd.dep.no
[3] Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society

[4] Govt. White Paper no. 30 (2002-2003)
[5] Internal Market Scoreboard
[6] The proportion of production growth which cannot be attributed to an increase in the expenditure of resources such as workforce and capital is expressed as growth in the total factor productivity. This is usually what is meant when the term growth in productivity is used.

Table 1 Changes in the total factor productivity (TFP) among companies in mainland Norway[7] during the period 1982-2002[8]. The average percentage of annual growth rates.

	1982-1988	1989-1996	1997-2002
Agriculture	0.5	3.2	0.4
Forestry	2.4	3.4	1.4
Fishing	-1.7	6.6	1.4
Aquaculture	4.5	5.5	1.9
Production of consumer goods	0.0	0.2	0.3
Production of intermediate consumer and investment products	0.1	0.3	-0.2
Timber processing	1.6	1.5	0.7
Chemical raw products	1.9	0.8	-0.5
Production and refining of petroleum products etc.	0.1	-0.3	1.3
Metals	1.6	0.6	0.2
Production of workshop products	0.5	0.6	0.4
Construction of ships and oil platforms	1.1	-0.2	0.2
Building and construction	0.4	1.5	-0.8
Power generation	-0.9	1.2	3.5
Domestic transport	1.3	2.5	1.4
Commodity trading	1.4	3.6	3.9
Other private-sector provision of services	-0.3	-0.3	0.6
Mainland Norway in total	0.7	1.4	1.1

Source: Statistics Norway, adapted by ECON

In addition, exploitation of new technology constitutes a further reason for this growth.
The banking and insurance sector has not been included in the table due to its being difficult to gauge accurately. This is an area in which IT is considered to be of major importance.

Investment in IT yields substantial growth in productivity without appearing in available economic statistics, for example, if the finance industry were to experience a sharp rise in product development as a result of implementing new technology and new distribution methods. Bank payments have become rationalised, online banks have seen a huge surge in new customers and the new technology has facilitated the deployment of new and efficiency-enhancing solutions for industry. However, we are also well aware of the fact that statistics at best measure banks' savings in expenditure and not the increase in welfare on the part of consumers.

Entrepreneurship
The survey, Entrepreneurship in Norway/Global Entrepreneurship Monitor 2002, ranks Norway as 14th in the world in terms of creating new technology.[9] The survey suggests that there are problems associated with social approval of entrepreneurship, access to government funding/loans, equity, political prioritisation of entrepreneurship as well as higher educational levels in new technology and management. Norway's strength is seen to lie in its regulations, physical infrastructure, tax rates, informal investors, framework for women setting up their own business and its spirit of free enterprise.[10]

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eNorway as a value generator within industry

The eNorway plan is designed to promote value creation in Norwegian industry, partly through initiatives described in the chapter entitled "Good framework conditions for eNorway." Abelia has a keen interest in this vital area because IT companies, facing strong competition, rely on a framework that is at least as beneficial as in other countries.

Abelia is pleased with some of the changes in industry policy that have evolved in recent years. Tax incentives for industry and a restrictive budget policy are important for the IT and knowledge-based business sectors. We are also happy that industry-oriented research has been given a well-earned boost with an independent IT research strategy drawn up, which could help lay the groundwork for favourable conditions for Norwegian exports and trade and industry in the future. We are also pleased that an independent IT strategy has been compiled for the public sector, which prioritises the introduction of electronic signatures and simplified data reporting procedures for enterprises to submit electronically to the government.

Nevertheless, Abelia is concerned that Norway is lagging behind other countries in terms of IT-based value creation, and is particularly keen on improving results within the following areas:

– Calls for more innovation within Norwegian industry and for more new research-based companies. Incentives and funding schemes must be geared towards underpinning commercialisation and innovation.

– Less R&D in Norway than in other countries, thus leading Abelia to expect a surge in IT research as a factor in the necessary expansion of Norwegian research efforts.

A survey conducted for the period 1999-2001 shows that 13 Norwegian companies were among the 100 fastest growing technology companies in Europe. Norway was the runner-up behind the United Kingdom with 24 companies. Nine of the 60 fastest growing companies were based in Norway.[11]

RELATIVELY FEW COMPANIES ARE EXPLOITING THE POTENTIAL IN E-COMMERCE

Norwegian players do not seem to be exploiting the potential of electronic commerce. Figures from Statistics Norway show that 13 per cent of Norwegian companies generated sales through using electronic commerce in 2001. The proportion of Norwegian companies buying or selling products online is lower than in other countries, in spite of ready access to IT. Figures from an EU survey conducted in 2002 on electronic commerce and SMEs[12] showed the following:

- Norway is the country in the survey in which the highest number of companies have made purchases through using e-commerce

However:
- Norway scores low in terms of the volume of goods or services sold online
- Norway scores significantly lower than, for example, Sweden and Denmark, in terms of the number of companies that have Internet access and their own home page.

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[7] Not including property, banking and insurance and oil refining.
[8] Interim data for 2001 and 2002.
[9] Handelshøgskolen i Bodø: "Entrepreneurship in Norway 2002" / Global Entrepreneurship Monitor (GEM) Norway Report.
[10] See Status Report on eNorway, January 2003 for a more detailed explanation.

[11] DeLoitte & Touche: European Technology Fast 500, December 2002.
[12] Final benchmarking report on national and regional policies in support of e-Business for SMEs, Enterprise DG, European Commission 28 June 2002

Figure 1 Percentage of companies in the EU purchasing and selling online. Source: e-Business Watch 2003
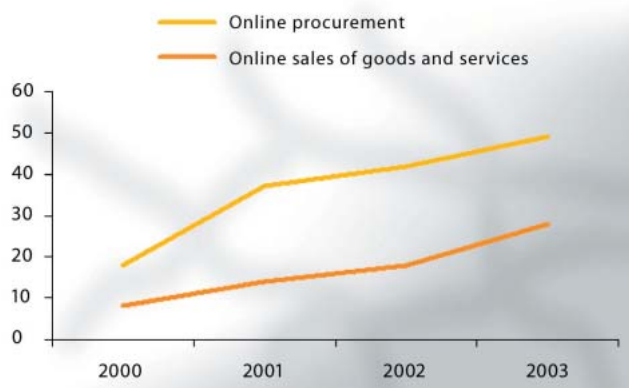
The report "Electronic commerce – Obstacles and Action" from Agderforskning[13], concludes that the lack of skills is one of the greatest barriers to the use of electronic business and commerce in Norway. This is consistent with surveys conducted in other countries. Other major obstacles that were identified included a lack of adaptation skills, standardisation and information surrounding legislation and regulations governing electronic commerce.

The whole industry, pressure groups and players in both the private and public sectors are directing their focus on activities to promote electronic commerce, e.g. through skills building. Since the end of 2002, the number of companies completing the e-strategy processes using tools contained in the Industrial and Regional Development Fund's (SND) "Verdiprogram"[14] [Value program]) has doubled (400 as at June 2003). The SND's E-barometer is a new and simple tool which SMEs can quickly use to test their company's maturity in relation to e-Business development and electronic business environments. The aim of the E-barometer is to help companies get going with more profitable IT utilisation to aid them in their business processes.[15]

The EU recently carried out an analysis of electronic commerce, focusing on 15 different sectors. This report, the European e-Business report, 2002/2003 edition[16] does not include Norway, but shows trends in Europe, which are vital to us as well.

The report indicates that there is generally a positive climate for electronic commerce, although not enthusiastic. The report also points out that electronic commerce has a significant bearing on customer/supplier relations, internal work processes and organisational structures. This corresponds well with findings from a number of Norwegian reports. A challenge for the future still remains, involving the integration of electronic commerce with business models as well as value chains, and being able to publicise good examples and potential gains.

An electronic marketplace is an application for use in promoting electronic trade and commerce. However, the actual use of marketplaces is rather limited at present, and the lack of user skills is a major impediment to its use as well.

eNorway: A vital component in the all-inclusive innovation policy

The greatest challenge confronting Norwegian companies is their need to be more competitive, particularly through innovation-based growth. eNorway is an invaluable asset in this respect.

We are faced by two major challenges; first, small companies exploit IT far less than they ought to; and secondly, Norway's vast geographic infrastructure represents huge challenges. IT can be looked at from a number of angles:

1. A key factor in achieving innovation processes throughout Norwegian industry
2. The IT industry keeps its own high pace for innovation and growth
3. Simplified data reporting to government agencies which makes more time available for value creation

The introduction of e-procurement and broadband roll-out demonstrates positive trends, although this must be carefully followed up.

NHO believe first and foremost that IT can be instrumental in boosting innovation within the Norwegian economy through implementing the available technologies at established companies. This will yield a strategic effect and will moreover result in growth within the Norwegian IT industry in line with a increasingly demanding domestic market

IT's role as a momentum to inspire innovation at small companies is particularly challenging for Norway. Boosting skills is crucial within small businesses which constitute the mainstay of Norwegian industry. A government funding scheme should be initiated to support businesses in addition to their own work within this area. (BIT, Verdi etc).

Consumer demand

Consumer demand for online shopping in Norway is good. According to surveys conducted by TNS Gallup, 56 per cent of Internet users had ordered products and services online once or twice. Out of these, 44 per cent had purchased something online over the past 30 days. Books, trips, IT equipment and clothes are still the most popular products purchased online. Flights purchased online amount to 84 per cent of trips booked online.

A survey, which was conducted by MMI for the foundation eforum.no in February 2003 revealed that while 690 000 people a month purchased products online each month during Q4 2002 (within all product categories), more than 600 000 Norwegians surfed the Internet to have a look at holidays before buying it over the telephone or at a travel agency. Seven per cent said that they had attempted to purchase something online over the past month, but broke off and cancelled the purchase with the most common reason given for this as technical error and complicated payment solutions.

The most common methods of online payment were stable i.e. approx. 45 per cent pay by giro and approx. 30 per cent by credit card. Simplicity is the key criterion when selecting a method of payment. When asked in February 2003, more than half the

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[13] Commissioned by the Ministry of Trade and Industry in autumn 2002, www.eNorway.org.
[14] SND's work on its Verdiprogram is designed to guide companies' skills development so that they can exploit information technology.
[15] The E-barometer is available from SND's website www.snd.no/utviklingsverktoy, cf e-analysis
[16] www.ebusiness-watch.org

population of Norway replied that transaction security is either extremely good or quite good.

During 2002, 82 million bills were paid through online banking. This denotes a sharp rise by 33 per cent compared to 2001 and this method of payment has now become more popular than paying bills by posting completed bills through a "brevgiro" agreement with a bank[17]

According to TNS Gallup, forecasts for online shopping are bright. 53 per cent of people having used the Internet over the past 30 days say that they will purchase something online during the next 12 months. Books and trips seem set to be the most popular articles for next year as well.

MUTUAL DEPENDENCY BETWEEN INTERNATIONALISATION AND RESEARCH

A study carried out by the NUPI *[The Norwegian Institute of Foreign Affairs]* on IT export companies revealed that only 3 per cent of exports occurs through e-commerce, although a significant proportion of IT products are shipped electronically.[18] The scope of electronic shipping keeps transportation costs low for IT companies.

Around half the companies believe that e-commerce will become more important, although just as many have less faith in it.

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eforum

Starting in autumn 1999, eforum commissioned MMI (opinion poll) to track e-commerce trends. The study shows a rise in e-commerce deployment, both in terms of the number of users and turnover in NOK. However, the survey is still unable to confirm that the market can function properly independently.
Internet shops form part of a retail chain. There is a need for standardisation work, logistics for the supply chain, PKI (public key infrastructure), effective payment solutions, adaptation to enable correct registration and the use of personal data.

- Individual Internet shop sales and profitability cannot be linked directly to positive market trends on account of the following:
- Foreign trade constitutes less than 40 per cent. We estimate that a rise in sales generated by this user group, mainly in the games and pornography areas
- The sales figure per transaction is growing, but still only by a small margins. Fall in profitability due to investment costs, substandard purchases and squeezed margins.

Progressive companies make an important contribution and deserve to be listened to and accommodated. Provision must be made for transferring skills and knowledge across physical and virtual networks. SMEs should receive incentives to invest in e-business solutions and improve employee awareness and skills within this field. eforum has developed a web solution designed for networking and is working towards setting up a project which could help the eNetwork become a reality.

Favourable consumer rights will force Norwegian companies to become more competitive. Companies taking trust and security seriously deserve notice and will subsequently dominate the market over less professional companies. It is vital to facilitate a good flow of information on consumer rights, amendments to legislation and recommended guidelines for running web shops. Nsafe are currently active in this area and should receive more focus and funding during its establishment phase.


Research-intensive companies have more faith in e-commerce, although the opposite is true of companies with a vast sales network. In other words, faith in e-commerce does not hinge on sales work made a high priority. However, whether this is owing to e-commerce solutions requiring special R&D work, or not the case because the robust sales organisation has a more "realistic" approach towards the potential in e-commerce, or perhaps they just feel threatened by trade devoid of personal dealings, is not answered in the study.

On average 60 per cent of IT companies have fewer than 10 customers in each foreign market. The average company spent 10-40 working days a year on selling to a typical foreign client in an export market. When sales call for such a huge effort, many dealings are difficult to explain through standard order forms submitted online.

"Locals" and "globals"

The NUPI survey revealed a clear divide between "locals", with an extensive domestic market and exports solely within their local area, and "globals", which operate on a global market and consider the Norwegian market to be of little significance. Small companies with large R&D facilities dominate the latter, whereas high, fixed costs incurred on sales outside the local area tend to encourage a "local" sales pattern for most others. The caricature epitomising the IT market as a "global supermarket" is only the case for specific niche markets. More often than not, internationalisation of IT entails extremely high fixed costs.

Figure 2 Percentage of companies regarding themselves as "local" or "global". Source: NUPI
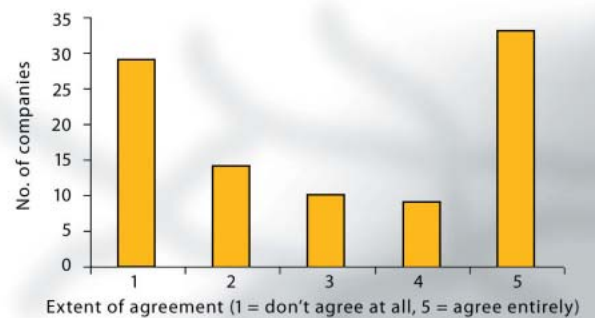
Opposites attract for internationalisation and research?

Some media reports on the NUPI's study seem to be making an issue out of the relation between investment in a sales network and R&D investment. The study, however, provides no foundation for these conclusions. This shows quite clearly that R&D, in-house training at companies and education are crucial for export and competitiveness. The study goes on to say that some companies on the committee experience the weaknesses in their sales system proves more of a bottleneck than any weaknesses from R&D activity. However, this does not mean that R&D funding is wasted, but is rather an argument to look at the connection between R&D commercialisation.

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[17] These figures are derived from the Bank of Norway's annual report on payment systems in 2002
[18] "Born global or local? Technology, market structure and export performance in the IT industries" (Melchior and Øi, 2003) The study is based on data on internationalisation collated from 110 Norwegian IT companies (excluding telecoms).

On average, IT companies have major fixed costs in the case of sales. These are somewhat less than IT companies' R&D investment costs. The study shows that companies with a good sales system manage better facing international competition, and that some companies that do well on the technology side don't do enough on the sales side. The study concludes by pointing out that export-oriented companies do not skimp on the R&D, but rather the opposite.

Other studies, such as the international assessment, conducted by the Norwegian Research Council, of Norwegian government IT research,[19] have, however, confirmed a generally low level of investment in Norwegian IT research and stressed that increased funding could yield an exceptionally good return on investment. Many of the research groups, which are awarded the best marks, are more involved in the theoretical side of the IT (information studies). There are few others which are within the technology fields in which Norwegian industry has the greatest need for IT skills.

Even though Norway generally manages best in the naturally sheltered areas of the IT industry, the study confirms that there are IT market segments in which Norway does well on an international arena. R&D, pay fore and access to a qualified workforce, as well as in-house training at companies, are definitely the most important aspect here on the plus side. But the negative flipside is access to capital.

The study also contains a number of results with more specific implications for the policy.

- There are weaknesses in the way Norwegian equity markets operate, and this should be discussed to see if anything can be done.
- The fact that a number of companies are strong on technology, but weaker on sales, could imply that funding awarded to commercial R&D ought to be granted on the basis of sales plans.
- For IT companies, and perhaps service companies in general, traditional trade barriers (customs duty etc) are less important than e.g. investment barriers and technical trade barriers.

Targets:

- *Norway should have a robust, effective and universally accessible infrastructure for electronic communication based on effective competition.*
- *The market should provide good access to broadband in all parts of the country. During the course of 2005, all primary and lower secondary schools, public libraries and local authority administrations should be able to access broadband at competitive prices. All upper secondary schools should have such access by the end of 2003.*
- *No later than the end of 2005, the groundwork will be laid for the general use of standard-based electronic signatures.*
- *A culture of security shall be developed in connection with the use and development of information systems and electronic communication.*
- *Important electronic communication infrastructure should be robust and secure, and critical information systems should be able to be secured to minimise the consequences of operational interruptions.*

NORWAY HAS GOOD ACCESS TO TRADITIONAL TELECOMMUNICATIONS AND BROADCASTING SERVICES

From 1998 onwards, large portions of the Norwegian telecommunications market was opened up to competition and many new players have established a presence in the market. As of 22nd April 2002, the Norwegian Post and Telecommunication Authority had registered a total of 84 providers of public telecommunications networks, public telecommunications service or transmission capacity.

There are a limited number of providers of separate infrastructures, i.e. players who primarily sell transmission capacity within:
- *Transmission networks* – the "main routes" of the networks, consisting of nodes and the connections between these.
- *Access networks* (connection networks) – the last link in the connection of the network between the individual end user (local authority administration, company, household) towards to a node with a connection to one or more transmission networks.

The most important access network technologies are the earthbound telecommunications networks, satellite systems, cable networks, mobile telephone systems and broadband wireless systems.

The vast majority of players however are pure service providers that provide and sell services. These players depend on being the purchase of network capacity in order to provide their services. The obligation to grant access to existing network resources has been a prerequisite when it comes to enabling new providers to establish a presence in the market and offer services in competition to Telenor. Competing providers currently have access to the exiting infrastructure view access to the fast access network (local loop unbundling), synchronized traffic, special network access, mobile communications networks, and transmission capacity (leased connections).

Figure 3 Market share, selected areas and companies. The Norwegian Post and Telecommunications Authority, October 2002
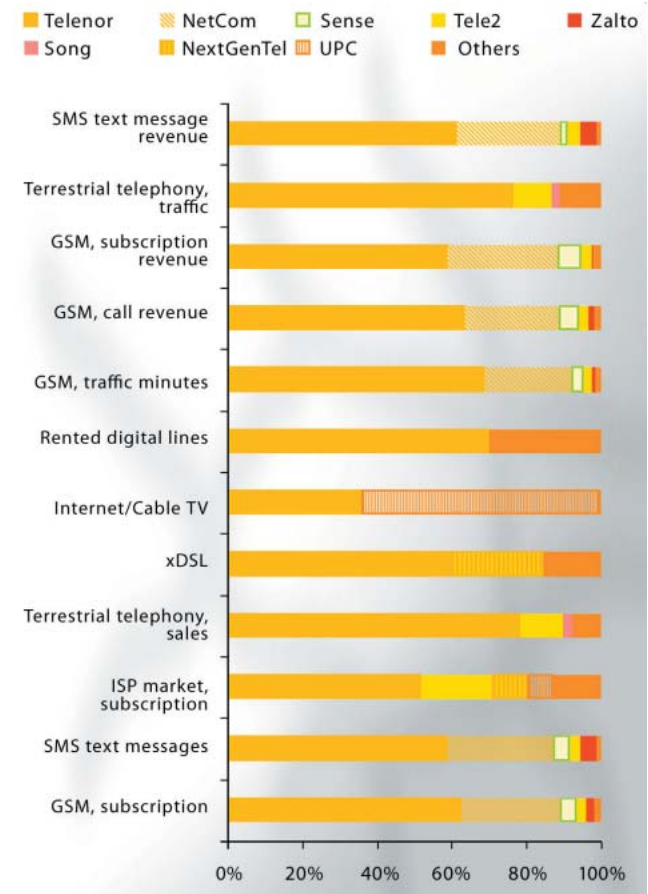
After five years with a deregulated telecommunications market, Telenor still holds a dominant position in the traditional telecommunications market. It is estimated that in 2002 Telenor had an overall market share of around 71 per cent of the end user turnover in the Norwegian telecommunications market. The thresholds small players have to cross in order to establish a presence are high, partly as a result of factors relating to economies of scale in the telecommunications market. Developments in the market have shown however that it is possible for Telenor's competitors to capture market shares and that these market shares are increasing.

Figure 4 Market shares for Telenor in the telecom market 1999-2002 as a percentage. Source: Norwegian Post and Telecommunications Authority, 2003
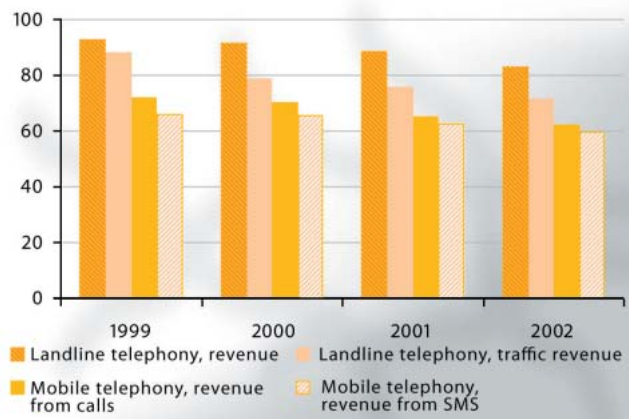
Two providers have constructed nationwide networks for public mobile communication. As of 2002, both mobile communications networks supported GPRS and high-speed data transmission for the wireless Internet. As per 01.06.2003, neither of the two concession owners ("wireless broadband" offer commercial UMTS, however both concession owners are in the process of rolling out such networks. Two new concessions will be auctioned off during the course of 2003.

In 2002, there were approximately 840,000 cable TV subscribers in Norway, of which around 52,000 had their broadband and around 21,500 their telephony services delivered over the cable TV network. [20]

There are two large suppliers of digital satellite services in Norway, and 73-98 per cent of the population are currently able to receive digital TV via satellite. Canal Digital, owned by Telenor, is the largest player within digital satellite and is estimated to have 11 per cent of Norwegian households as customers[21]. The other large player is ViaSat.

A consequence analysis from 2003 shows that the deregulation of telecommunications has impacted the prices of different user groups differently[22]. Telecommunications prices sank most prior to deregulation, while some prices have increased after deregulation, especially fixed charges and call connection fees.

It has become more *expensive* for users to own a telephone, but *cheaper* for them to use it. Higher income groups have ended up with cheaper services while lower income groups have ended up with more expensive services. The increase in costs has been particularly large in Northern Norway. Business has gained much from the restructuring of prices following deregulation; however small companies and broadband users have played less of a part in this development.

Service delivery is conspicuously different between the regions and more central areas, especially with respect to broadband, and to some degree when it comes to mobile telephony. Analyses indicate that the regime of competition has not worked equally well in all areas. In some cases increased competition has resulted in higher prices.

THE BROADBAND MARKET IS DEVELOPING QUICKLY, BUT WILL NOT COVER THE ENTIRE COUNTRY

By the summer of 2003, an estimated 65 per cent of the Norwegian population will be able to access the broadband network, primarily on the basis of copper technology (xDSL), (remote) cable and wireless technologies. The total market divides up like this:

- an estimated 77 to 78 per cent has xDSL
- 17 to 18 per cent have cable
- approx. 5 per cent have other technologies such as fibre optics and wireless access

Figure 5 Technology share for broadband. Source: Norsk Telecom AS
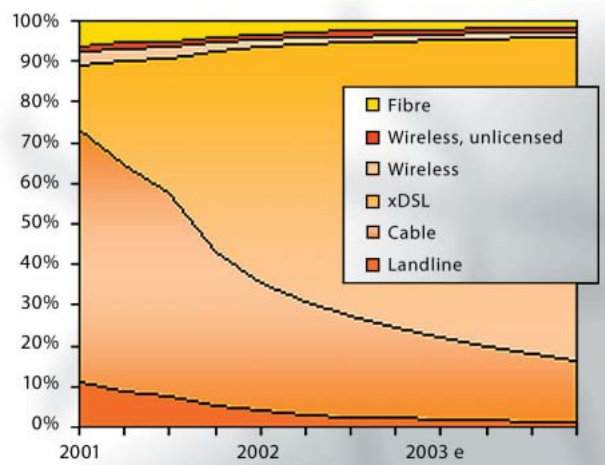
The market share for xDSL is expected to increase to around 80 per cent during the course of 2003, while cable is expected to experience a reduction in market share to around 15 per cent [23]. Telenor alone will cover about 64 per cent of subscribers through its ADSL service by the end of autumn 2003.

Expansion is particularly concentrated in urban areas, although a considerable number of local or regional initiatives exist.

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[20] Norwegian Post antd Telecommunication Authority, May 2003.
[21] Norwegian Post and Telecommunication Authority
[22] Eli Skogerbø/Tanja Storsul, "Implementering og reguleringseffektivitet i nye teleregimer" (Implementation and the effectiveness of regulation in new telecommunication regimes), the SKIKT project, April/May 2003.

[23] Source: Norsk Telecom AS

Customer uptake

The autumn of 2002 and the spring of 2003 saw a transition from an expansion phase to an uptake phase. In the last six months, uptake by customers has been significantly higher than the expansion of services, whereas customer uptake in 2002 did not keep pace with expansion.

The tempo of the development of the broadband network has mirrored the introduction of the dial-up Internet and ISDN well. However, there appears to be agreement that there is still considerable potential for further growth as far as companies, public enterprises, and private households are concerned.

**Figure 6 Growth in various telecom products. Source: Norsk Telecom AS**
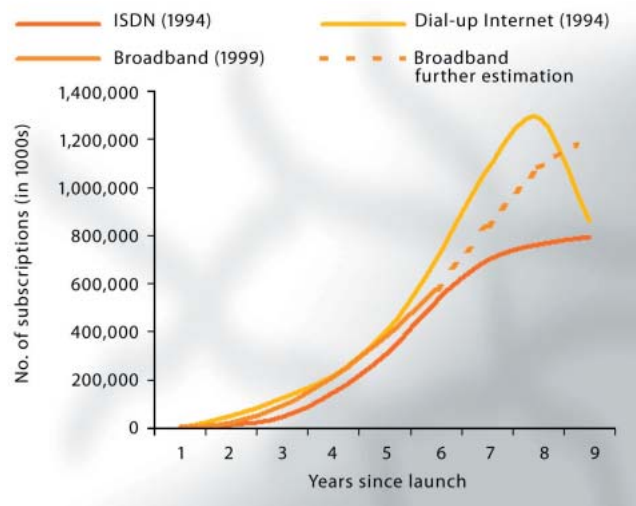
In April 2003, an estimated 14 per cent of households and 13 per cent of companies were connected to the broadband network, and these figures are expected to increase considerably during the course of the year. At the start of 2003, there were approximately 215,000 broadband users in the country, and this figure is expected to climb to 400,000 before the end of the year.

23 per cent of the households that are connected to the Internet stated in February this year that they were connected to the Internet via broadband ADSL or faster means. At the same time ISDN is losing market share, though with 40 per cent of Internet users ISDN is still the commonest method of connection.

It continues to appear that those who acquire broadband have previously had ISDN and that those with the slowest speed connections do not purchase faster access. The regional differences remain. Households in Oslo/Akershus, where 35 per cent of households with the Internet state they have broadband access, are the most likely to have broadband. The regions with the lowest share of broadband users are Trøndelag and Northern Norway with 14 per cent[24].

Figure 7 Broadband usage for households and among companies with employees distributed per county for Q1 2003. Source: Norsk Telecom AS and Statistics Norway
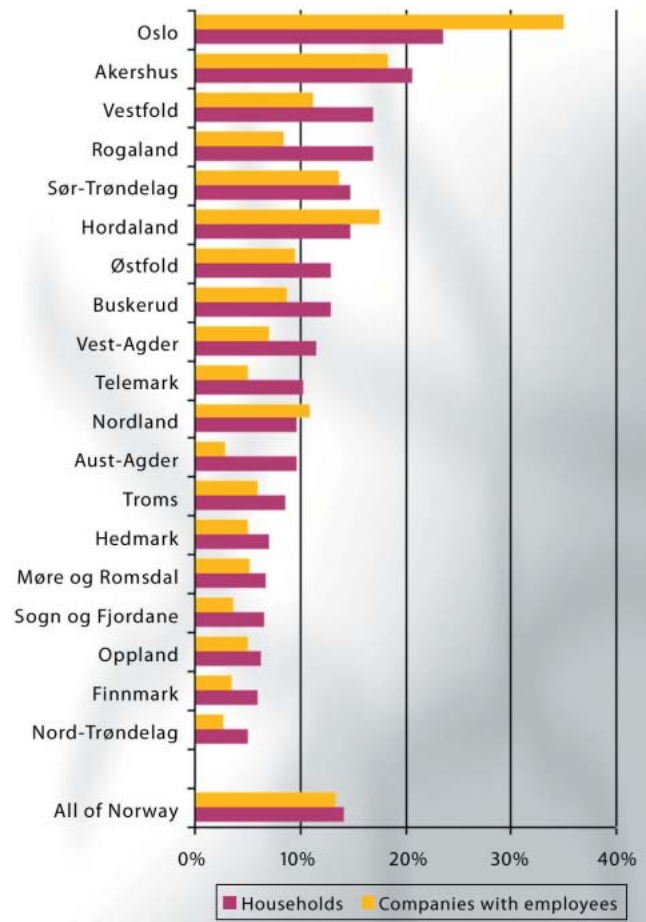
Broadband in municipalities, sixth form colleges and health enterprises

The figure below indicates the proportion of public institutions with broadband connections, excluding hospitals and the nursing and care sector. The definition of broadband used here includes transmission speeds normally regarded as slower than broadband, because the institutions concerned can easily upgrade their connection to broadband speeds if they wish. Using this comprehensive definition, more than half of all public institutions are connected to broadband, although there are considerable variations depending on the type of institution.

81 per cent of town halls are now connected to broadband. Many of these have chosen to rent lines which can sometimes have speeds as slows as 64 Kbit/s. As for the remaining 19 per cent, most of these have ISDN connections. This applies particularly to town halls in small municipalities. 35 per cent of town halls have connections with a capacity of between 2 and 10 Mbit/s.

53 per cent of libraries are now connected to broadband. The

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[24] TNS Gallup Interbuss 1 2003, 3/2002

Figure 8 Broadband connection for local authority institutions and sixth-form colleges. Source: ECON/Teleplan December 2002
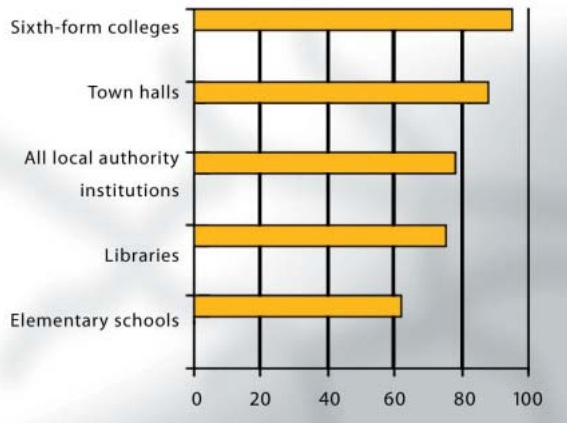
remaining 47 per cent are mostly connected via ISDN. 44 per cent of libraries have a capacity of 128 Kbit/s or less. But only 19 per cent of library visitors use libraries with ISDN connections. For fibre optic connections, the picture is reversed. 19 per cent of libraries have fibre optic connections, but these libraries serve 38 per cent of all those who use a library. In other words, ISDN is principally used by small libraries (libraries with few visitors), while the large libraries tend to use fibre optic connections.

42 per cent of primary schools now have a broadband connection. The remaining 58 per cent are mostly connected via ISDN. 53 per cent of primary schools have a capacity of 128 Kbit/s or less. The small schools, in particular, use ISDN while larger schools are generally connected via radio (9 per cent), fibre optic cable (11 per cent) or rented lines (14 per cent).

If rented lines are counted as broadband, 92 per cent of sixth form colleges now have a broadband connection. ISDN is almost absent from sixth form colleges (7 per cent). These colleges have a high proportion of rented lines (49 per cent), but fibre optic connections (22 per cent) and SDSL (17 per cent) are also well represented. 58 per cent of sixth form colleges have a capacity of between 2 and 10 Mbit/s.

One of the objectives in the eNorway Plan was that all hospitals should be able to connect to broadband in 2002. At the end of 2002, this objective was reached for 39 of the total 42 health enterprises. Work on a national health network has been based on the national IT Plan for 2001-2003, and the aim is that the network will be in place before the end of 2003. This national health network will consist of 5 regional health networks (owned by the regional health enterprises) and a central infrastructure (owned by the Directorate of Health and Social Affairs (*Sosial- og helsedirektoratet*)) which connects the regional health networks together. The regional networks will link the health enterprises together and will also, as they are further developed, link the doctors' surgeries in their region.

Nordic comparisons

The rolling out of broadband in the Nordic countries has come a long way, but there are significant differences in the speed of these developments. In December 2002, Denmark and Iceland had a coverage of around 95 per cent, while Finland, Sweden and Norway had coverages of 75, 72 and 60 per cent respectively. It is calculated that Norway will achieve close to 65 per cent coverage during 2003. This coverage is measured in terms of the number of private homes that have the opportunity to connect to broadband. The type of access technology varies somewhat between the Nordic countries, but xDSL dominates all the markets.

Figure 9 Nordic households with broadband connection as a percentage. Source: Norsk Telecom AS
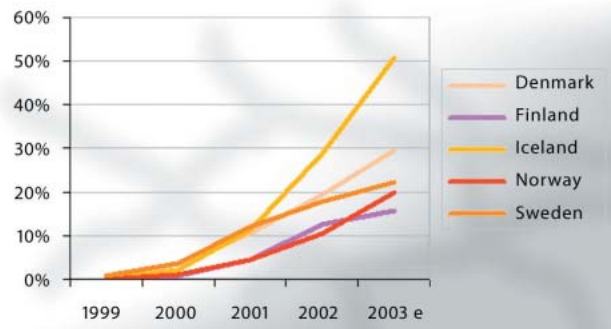
Prices in the Nordic countries

Norwegian Telecom AS has obtained prices from most broadband providers across the Nordic market. To provide the best overview, all prices contained in the graphs have been converted to illustrate the private and corporate segments respectively below. The currency used here is the Euro to make comparison easier. Prices here are for subsciptions on a rolling monthly basis, with no additional connection charges etc.

Figure 10 Price comparison broadband. Private market. Source: Norsk Telecom AS
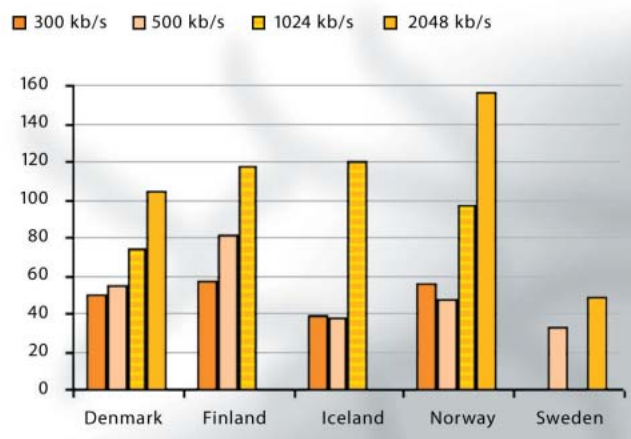
Prices in the private market are not straightforward. Icelandic prices are generally reasonable. Norway basically does not have any competition along the axes – 500 kbit/s – so there are fewer prices to relate to in this segment.

There is wider divergence in speed in the corporate market – and in price therefore. Icelandic prices are also very good here as well, and it would appear from the graph that Norwegian prices are somewhat higher than the equivalent prices in the other Nordic countries.

However, it is difficult to get a full picture of the complete range of prices as there are many variables and disparate products here. For example, the players operate under different constraints or other usage limitations, subscription periods and subsidies, installation charges, transfer speed guarantees or even differing incoming and outgoing speeds. These comparisons in price can never be "fair" without an extremely painstakingly detailed investigation into every single product.

THE INTRODUCTION OF ELECTRONIC SIGNATURES IS PROCEEDING MORE SLOWLY THAN EXPECTED

As in many other countries, the introduction of electronic signatures (PKI) in Norway has proceeded slowly. This is partly because the market for e-signature solutions has not yet properly developed. At present there is only one supplier of e-signatures in the Norwegian market – *ZebSign* (owned by *Telenor* and The Norwegian Post Office (*Posten*) in partnership), with a number of sales channels such as *ErgoGroup* or *BuyPass AS*. It was anticipated that the banks would have started to offer solutions based on the common infrastructure for *BankID*, but this has not yet happened.

Skandiabanken uses PKI for access to Internet banking for approximately 200,000 customers in Norway. For playing and paying on the Internet, *Norsk Tipping* has supplied solutions to around 50,000 households for e-signatures based on smart cards. In addition, *DnB* uses PKI for access to Internet banking, but in a closed system. *Telenor Mobil*, in collaboration with *DnB*, offers the *SmartPay* payment service which uses a PKI solution in the mobile telephone's SIM card. Some individual municipalities are now experimenting with the use of this ´mobile PKI' for signing electronic forms and for electronic case handling. In collaboration with *ErgoGroup*, the Post Office is conducting trials with an ´electronic citizen card' (electronic ID card) in *Oppdal municipality*. One of the intended applications for this card will be the registering of voters for the municipal election in the autumn.

Rikstrygdeverket (the National Insurance Administration) has entered into a framework agreement with *ErgoGroup* for the delivery of PKI-based e-signatures to all the doctors' surgeries, hospitals and other health institutions in the country. One of the applications of this solution will be the sending of doctors' certificates for time off work to the *Rikstrygdeverket*. This will fully implemented on 12 May 2003.

Ongoing work to organize and coordinate the establishment

of a social infrastructure for e-signatures based on PKI is being undertaken in collaboration with the NHD and the AAD (Ministry of Labour and Administration), and with the support of PKI-Forum.[25] Work is in hand at AAD to establish a coordinating body for PKI in the public sector, which will start to operate in September.

IT TAKES TIME TO DEVELOP A CULTURE OF SECURITY

In February 2003, 27 per cent of households using the Internet stated that they had received a virus during the last 12 months. This same figure for November 2002 was 27 per cent, then 20 per cent in February 2002 and 13 per cent in August 2001.[26] The corresponding figure for the EU is 23 per cent.[27] These figures show that there is a need among Internet users for a greater understanding of how to tackle viruses. Commercial surveys indicate that, among private and small customers, most viruses are transmitted via the Internet provider, and primarily affect Internet products from market-dominating niche-suppliers. [28]

Figure 11 Country of origin for for unsolicited mapping of potential safety holes in the major Norwegian networks. Source: VDI

- UK
- Russia
- Italy
- Germany
- Netherlands
- Norway
- USA
- Australia
- Ukraine
- Canada
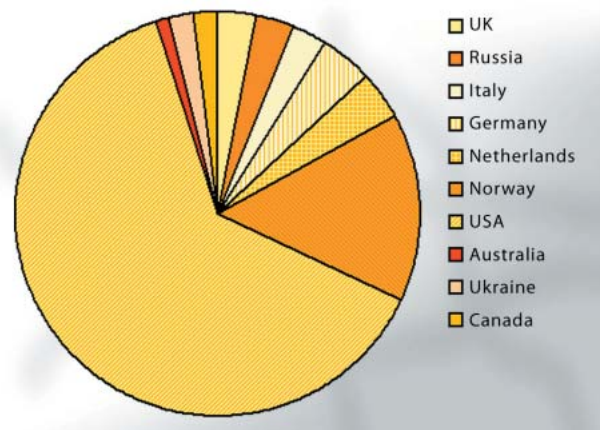
IT security and the security culture

In May 2003 the Government approved a National Strategy for Information Security consisting of a prioritised list of measures to be implemented in the next 2-3 years for protecting critical IT infrastructures and systems, introducing a culture of security in Norwegian enterprises and preparing the way for the coordinated development and enforcement of a body of regulations concerning IT security. This strategy also includes a secondary strategy for the building up of a social infrastructure for e-signatures in Norway (see the section above), as a link in the establishment of confidence and security in electronic commercial transactions and electronic services on the Internet.

[25] http://www.pki-forum.no
[26] TNS Gallup, Interbuss 1/2003
[27] The EU Commission's Eurobarometer, Euroflash 125, June 2002.
[28] Source: VirusFree/ Itegra <http://www.virusfree.no/statistics.asp >

- The requirement for special expertise in IT security will be partly met by the foundation of Norway's first master's degree course in Information Security in August 2002 at Gjøvik University College (*Høgskolen på Gjøvik*), which is now educating the first 25 students to have matriculated. [29]
- The certification scheme for IT security in organisations is now fully operational under the aegis of Norsk Akkreditering, and so far certificates have been awarded to 8 companies based on the BS7799-2 standard. Three certifying bodies have been accredited.
- The Norwegian National Security Authority (*Nasjonal sikkerhetsmyndighet*) is currently setting up SERTIT – a scheme for certifying the security of IT products and systems. One of the applications of this scheme will be the evaluation of products intended to secure critical IT infrastructures.
- The Norwegian Post and Telecommunication Authority (*Post- og teletilsynet*) has established a resource group for Internet-related issues. This group is an open forum whose aim is to identify and describe important issues relating to the Internet, including security, then to make recommendations and suggest possible solutions.

The Police Data Crime Centre

Very few cases of data crime are reported. The figures obtained from Økokrim ('White Collar Crime') and the Police Data Crime Centre indicate that 19 cases of data crime were reported in 1999, 27 in 2000 and 34 in 2001. In 2002 the figure dropped to 24. From then until May 2003, 7 cases were reported. Denial-of-service attacks, in particular, are seldom reported to the extent in which they occur.

The Police Data Crime Centre was officially opened on 15 May 2003. This centre is designed as a combination of a national operational police headquarters for preventing, investigating and prosecuting data crime, and a centre of expertise for furthering the understanding of methods and technologies in the fight against crime. The centre will also assist the entire police service in the securing and analysing of electronic evidence, particularly in larger and more complex cases.

The Centre for Information Security.

The Centre for Information Security (*Senter for informasjonssikring (SIS)*) was established in April 2002. SIS is continuously documenting the nature of the threats to security, based on the source material to which the centre has so far had access. Some of this comes from public sources and others from sources provided as the result of formal agreements entered into with companies or organisations. The source material includes both Norwegian and international records together with research data and experience.

The SIS website[30] is a useful source of information on information security. It includes both original material, practical guides, articles on pertinent issues relating to information security and links to other useful information. The SIS endeavours to be a neutral agency which does not promote products or services.

VDI – Warning System for Digital Infrastructure (*Varslingsystem for Digital Infrastruktur*)

Data attacks on IT systems presents a serious threat for modern society. A new world requires new security systems. This refers particularly to systems which can discover, warn, prevent and counter-attack coordinated digital attacks on critical infrastructure.

The Warning System for Digital Infrastructure (VDI) is a cooperative project involving the EOS services[31] and certain government agencies and private companies with socio-critical infrastructures and experience of protecting their own computer networks.

The VDI has been developed to identify, compare and issue warnings concerning attacks that occur daily against Norway as a nation. The system analyses the attack on the participants' computer network that is linked to the Internet. VDI is also a tool for preparing threat assessments and for providing a better understanding of the threat represented by data attacks via the Internet. VDI also provides a platform for assessing existing security mechanisms and for proposing improvements which could help to reduce our society's vulnerability.

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[30] www.norsis.no
[31] (EOS: Norwegian Parliament's special committee for scrutiny of the secret services.) The EOS services (Military Intelligence Service (*Forsvarets Etterretningstjeneste*), Police Security Service (*Politiets overvåkingstjeneste*) and Headquarters Defence Command Norway / Security (*Forsvarets overkommando/ Sikkerhetsstaben*). It has now been determined that the VDI project will be established as a permanent system under the Norwegian National Security Authority (*Nasjonal Sikkerhetsmyndighet (NSM)*)

Targets:
- *IT shall help improve the learning environment, individually adapted learning and promote enhanced quality in education.*
- *There shall be access to sufficient labour, with both general and special IT skills.*
- *Norwegian enterprises shall have the requisite skills for exploiting the potential of information technology.*
- *People shall have the knowledge and skills they need to put this technology to good use.*

IT IN NORWEGIAN EDUCATION – OVERVIEW AND BACKGROUND

IT in education has been an important issue since the first White paper to the Storting [parliament] in 1984[32]. It backed a series of initiatives and action plans in the period ending in 1993-94. In the Report to the Storting no. 24 (1993-94), Concerning information technology in education *[Om informasjonstechnology i utdanningen]*, these initiatives were reported, and new ones were initiated from 1995. This White paper was also followed by a series of action plans.

From 2000, funding for IT in education increased, from 38 to 200 million kroner per year.

Below is an overview of the Government's financial commitment to IT in education during this period. The amount is in excess of 1 billion kroner for the years 2000-2003. This does not include significant contributions from the school owners – i.e. the local authorities and the county municipalities.

Funds allocated for IT in Norwegian education 2000-2003

Altogether, during the period 2000-2003, 1.06 billion kroner were earmarked for IT in education over the Ministry of Education's budget.

Area/action	2000 Sum, total	2001 Sum, total	2002 Sum, total	2003 Sum, total	2000 - 2003 Sum, total
Pedagogical adoption	27,5	49,0	66,6	63,1	206,2
Development of skills for teachers	75,0	114,0	132,5	135,0	456,5
Research- and development	55,0	70,4	45,1	51,0	221,5
Organisational adoption	5,0	3,3	5,2	4,9	18,4
Broadband – infrastructure	20,2	37,7	33,3	32,0	123,2
Administration.	6,3	6,1	9,9	12,9	35,2

Milestones in IT commitment within the Norwegian educational system

The White paper to the storting no. 39 (1983-94), Computer technology in the schools [Datateknolog i skolen], was the first presentation of the need for IT in education. This white paper laid the foundation for the establishment of a Computing Secretariate under the auspices of the Ministry of Education, whose task was to develop educational software for use in the schools – in particular, software specially designed for special education.

At the end of the 1980s, the Computing Secretariate [Datasekretariatet] developed Winix, a software program designed to give schools access to the Internet by means of PCs. This was one of the first initiatives that linked PCs to the Internet, which, until then, had been the domain of higher education and research institutions who used Unix-based systems. From a purely technical standpoint, these systems worked just fine, but their commercialisation was controversial, as were the business models and state involvement and ownership.

During Reform 94, information technology and economics were introduced as subject in the general course of study. In order to meet the IT equipment requirements of the subject, the schools were charged with obtaining necessary computer equipment during a 5-year period. This led to widespread acquisition of equipment and put Norway at the head of the class, so to speak, at the upper secondary level. Nevertheless, the curricula, for the most part, did not take IT into account in any systematic manner.

In 1997 the so-called L97 was introduced – new curricula for elementary and lower secondary school – where IT became an integral part of many subjects. The plan made allowances, however, for the realisation of the IT parts of the curricula to the extent that there was enough computer equipment. The local authorities were not required to acquire enough computer equipment for the schools. This reservation has since been lifted.
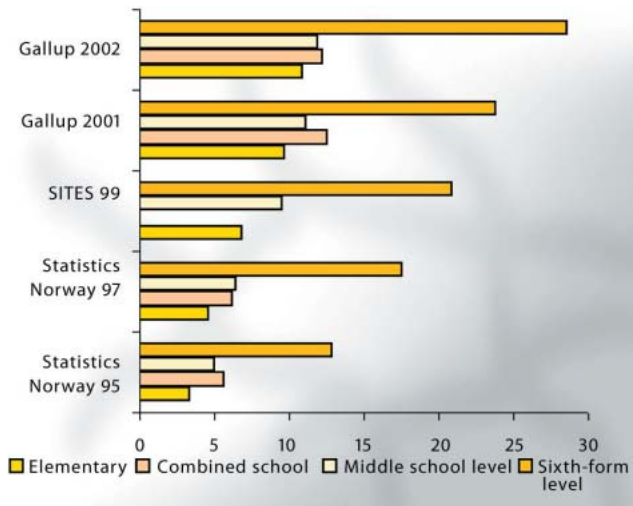
In 1995, the Plan for IT in Norwegian education 1996-99 was launched, and in 1999 the "ICT in Norwegian education. Plan for 2000-2003" was introduced. There are supplementary detailed plans for plans.

IT equipment in Norwegian schools

PC concentration
Altogether, in 1982/83 there were approx. 900 PCs in the elementary and lower secondary schools, or approx. 4 schools per PC. In 2002/03 that figure had risen to 20 PCs per school. During the course of 20 years, the number of PCs in the elementary and lower secondary schools has increased by a factor of over 70. In 1995, at the elementary level there were 29.7 pupils per PC. In 2002 there were 9.2 (from 3.4 PCs per 100 pupiuls to 10.9). In 1995, upper secondary schools had a total of 7.8 pupils per PC, while in 2002 there were 3.5 (from 12.8 PCs per 100 pupils to 28.6). For lower secondary schools and

[32] White paper to the Storting no. 39 (1983-84) Computer technology in the schools

Figure 12 No. of PCs connected online per 100 pupils

Figure 14 No. of Internet PCs per 100 pupils EU/EEA countries. Source: EU Commission

comobined elementary and lower secondary schools, there were, respectively, 19.9 and 17.8 pupils per PC in 1995, and 8.4 and 8.2, respectively, in 2002.

Access to a PC at one's own workplace/teacher's office is now commonplace for teachers. The results show that the best concentration of PCs is in the upper secondary schools, at 1.9 teachers per PC. The figures for elementary and lower secondary schools, on the other hand, was between 2.9 and 3.9 teachers per PC.

Internet connection
The latest studies show that around 95 per cent of all schools are now online – i.e. 99 per cent of all lower and upper secondary schools and 93 per cent of all elementary schools.

The current goal is to ensure that as many as possible of the schools' PCs that are wired for the Internet will have the capacity for sound and images. The figure below shows the number of Internet-wired PCs per 100 pupils in a number of countries, as well as for the EU as a whole. The figure shows that the Nordic countries compare favourably, with Denmark leading the way.

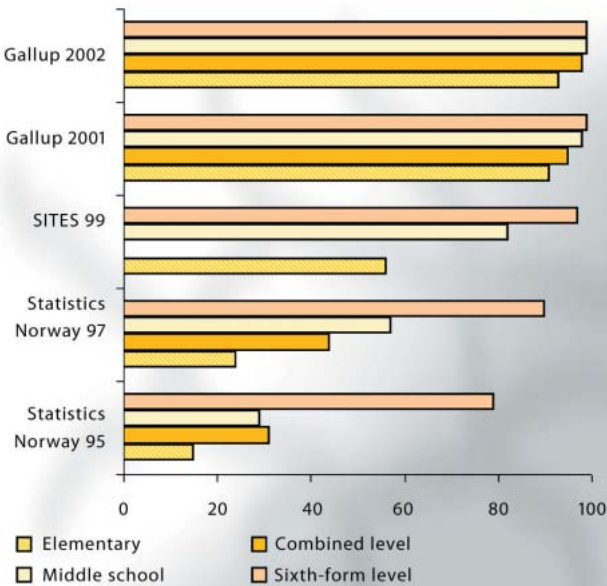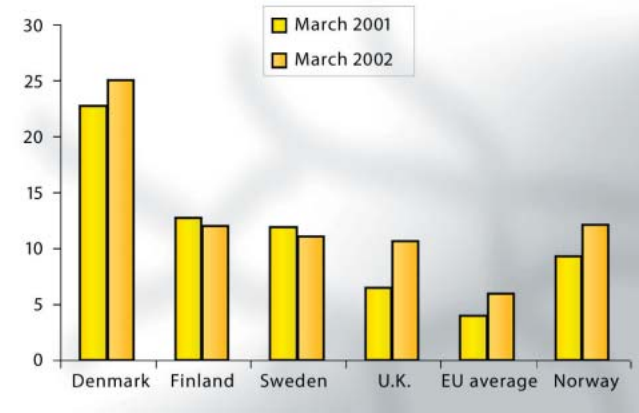**Figure 13 The percentage of schools with online access**


Pupils' use of IT
Most pupils have access to PCs and the Internet at home. It appears that boys have slightly better access than girls. The gender difference in time spent at the PC outside of school hours is significant. Girls spend less time than boys, and this is true for both elementary and secondary schools.

Follow-up work/evaluation. There were small variations between types of school and between genders.

During the spring of 2002, the firm Datakortet conducted a survey, on behalf of UFD, of pupils' and teachers' IT skills. The study included an independent evaluation and a practical test[33]. Only 5 per cent of the teachers in the study stated that they did not use IT in their teaching, including preparation for their classroom teaching and their follow-up work/evaluation. The largest group of teachers (32 per cent) stated that they did use IT, both in preparatory work, execution and follow-up/evaluation. over 20 per cent stated that they used IT in their preparatory work and execution.

A comparison of the results of pupils and teachers on achievement tests shows that boys in elementary and lower secondary school, in particular, assessed their achievements higher than their actual test results, and that women teachers in

Figure 15 Pupils PC and Internet use
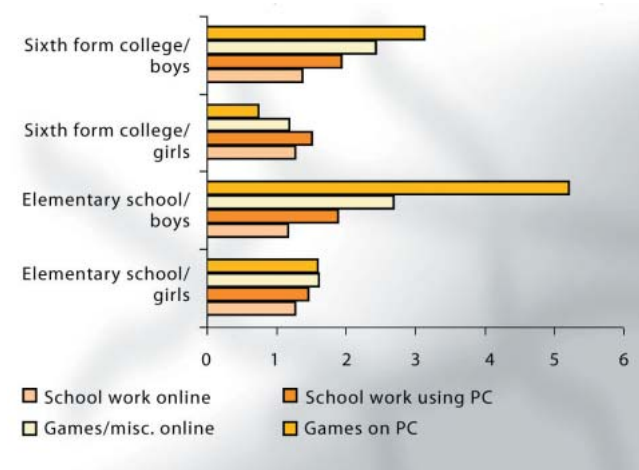
[33] Survey report for eNorway, January 2003

elementary and lower secondary schools tended to underrate their actual test results.

It is important to note that the teachers actually had better IT skills than the pupils. At both elementary and lower secondary school levels, the teachers scored higher than the pupils in IT skills, but the difference was less pronounced at the upper secondary school level.

IT IN HIGHER EDUCATION

The figure below shows the development of IT candidates in higher education. It shows an increase for undergraduate degrees and a stagnation for graduate degrees.

Figure 16 Development of IT candidates in higher education. Source: UFD
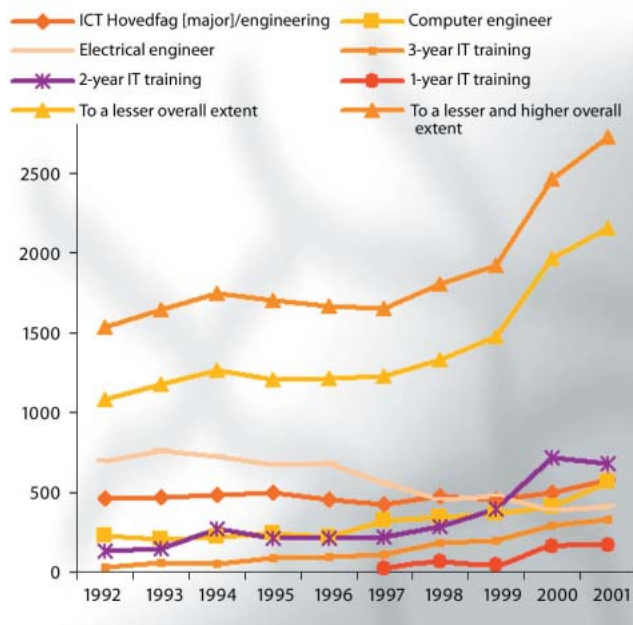
In 1992-93, the percentage of women in IT studies was between 10 and 23 per cent. In 2000-01, it was between 9 and 40 per cent. The rates were particularly low for women graduate engineering candidates – in fact, as low as 9 per cent.

About 4 per cent of higher education in Norway involves IT subjects.[34] This constitutes a 7th plass in the OECD ranking from the year 2002. Norway and Iceland head the Nordic countries.

From 2002 to 2003, candidates for IT studies sank by 10 per cent, and by 26 per cent from 2001 to 2003.

IT in education and learning

Experience gained from "Operasjon skoleverk" [Operation School System][35] has demonstrated the Norwegian population's willingness to use the Internet – and indeed the ability to do so – but access to computers is limited and line capacity leaves a lot to be desired. This hampers efficient deployment of IT in classroom teaching. Many pupils are good at finding information online, but need competent guidance in assessing the quality of their web sources in their project work. Moreover, OECD figures indicate low levels of IT deployment by pupils at Norwegian schools.

Dataforeningen [The Norwegian Computer Society] is calling for sweeping measures to raise skills and knowledge levels throughout the entire school system – from elementary school to university. This plan would need to include the following elements:

Basic training in IT must become "the 4th 'R'" for everyone – in addition to reading, writing and arithmetic.
Radical improvement in access to computers and expanded line capacity.
Maths and science modules must be reinforced, as these form the basis for college-level IT training.
IT must be incorporated in education and post-graduate teacher training to a far greater extent than is true today.
.
Access to a skilled workforce
Skills in general, and IT skills in particular, can be compared to "fresh produce" – unless replenished continually, it will wither and die. Hard times hitting the IT industry have lead to record levels of unemployment, and enormous investments in skills now stand in danger of "rotting at the root." Meanwhile, the numbers of students applying for IT educational courses has dropped. Much the same situation prevailed in the early 1990s, and a short recession resulted in IT skills becoming a limited and highly sought-after resource later on during the decade.

Table 2 First choice applicants to 113 electro-, IT- and IT-related branches of study at all colleges and universities (Source: Samordnet opptak/ Computerworld Norway)

2001	6021
2002	4960
2003	4457

The workforce has a need for highly educated graduates in IT, organisation and electronic commerce.

According to Aetat, unemployment in the most technical IT occupations has risen this past year. In April 2003, 2,106 people were registered as unemployed in IT occupations[36], or 3.6 per cent – an increase of 54 per cent siden 2002. These figures do not include IT managers, consultants and other commercial occupations. Therefore, the actual figures are probably higher.[37]

Apparently, there is still a big need for qualified labour, both in industry and, particularly, in the public sector. The trend is towards more rapid change in the need for labour and skills in fields and occupations that rely heavily on IT.

[34] I 2001 there were 4,600 admissions within IT in Norway. Norway's network council estimates that approx. 5 per cent of admissions in Norway are "pure" IT studies, and approx. 8 per cent of candidate production is in the same studies (Source: Report on IT as a discipline in higher education", Norway's network council *[Norges nettrådet]*, October 2002.

[35] Through "Operasjon skoleverk" [Operation School System], The Norwegian Computer Society organised an IT day for secondary schools all over Norway. Members fanned out to schools and taught pupils the basics to find the best ways of using the Internet to find the information they need, when they need it.
[36] The following occupational groups were counted: system analysts, programmers, computer engineers and technicians.
[37] Aetat, May 2003. Total unemployment was at 3.9 per cent, and thus slightly higher than for IT occupations.

ICT Norway

The skills gap in the IT sector – fact or fiction?

Claims of inadequate supplies of skilled workers once abounded In the Norwegian IT sector, with a dismal picture of how the industry would cope with national demand in the years to come. The industry raised the alarm with their gloomy forecast for the future. Fortunately, these scenarios were based on our knowledge then of the future in 1999 and 2000, so the predicted shortage of 15,000 IT employees by the year 2003 is easy to reject now. There are many reasons why this didn't come true – although common to all was an exaggerated faith in the future.

Nevertheless, we should note that fewer than 10% of the 12,000 people who lost their jobs in the IT sector over the past two years are still unemployed today. This tells us that, even though the sector as such is experiencing a dearth of orders, society will always be in constant need of IT skills.

The constant fluctuations and glare of attention was found troublesome by the industry, particularly after having fallen from its exalted heights to what are perceived to be the lowest depths. Since 2000, the number of people applying for IT courses has plummeted by 50%, and, unless this trend is halted, the IT industry will suffer long-term negative impact. This could in turn lead to fewer new students and a depleted workforce in 2005 and 2006. A steady supply of well-qualified IT workers at all levels is essential to the IT industry.

IT skills are required in many sectors, not only in the IT sector. Figures from the US show that nearly 2/3 of highly educated IT jobs are in other sectors.[38]

Danish reports show similar trends: Having an IT job, being employed in a company in the IT industry and being educated in the field of IT are three different things that are only loosely related. The Danish figures show that only 12 per cent of those who have IT jobs and are employed in the IT industry also have a formal education in IT.[39]

Figures from the US, the United Kingdom and Denmark indicate little connection between a formal IT education and employment in an IT industry. Only a third of those who are employed in IT industries in Denmark and the United Kingdom have formal training in IT. We assume that the situation for Norway is similar. The hallmark of the skills situation in IT industries is a high education, lots of R&D, and recruitment from many different areas. In addition, the IT education itself is now geared towards the entire knowledge society, and not just towards IT industries.[40] The EBIP and SØK-Verdi studies show that the most significant lack of IT skills in Norwegian industry today is related to low commercial e-business skills, and has very little to do with pure tecnological skills.[41]

PLANS – MAIN ACTIVITIES

Access to broadband at schools – a prerequisite for schools' IT commitment

The HØYKOM-Skole programme was initiated in the autumn of 2002. Its purpose was to promote the use of broadband in schools. This was crucial for accelerating roll-out of the broadband infrastructure expansion and enabling schools to utilize digital content in classroom teaching. A national working committee has also been set up, whose task is to determine the scope of broadband services in the education sector. The HØYKOM-Skole programme is being developed further in 2003.

The fibre school project, under the auspices of UNINETT, has played an important role in gaining experience from bringing broadband services to more and more Norwegian schools. The local authorities in the following municipalities participated in the project: Alta, Molde and Tønsberg (Åmot and Steinkjer). This has had a carryover effect in other municipalities and instigated new working constellations.

Broadband for research and higher education

UNINETT, the research network in Norway, provides online services to all Norwegian universities, and state, scientific and art colleges in the districts. UNINETT also serves non-commercial research and education-oriented institutions. All told, the network provider serves approx. 300 institutions and around 200,000 PCs with roughly a quarter of a million users.

UNINETT has recently signed an agreement with BaneTele for the delivery of transmission capacity to the research network. With this agreement as a basis, UNINETT will be able to expand the entire college and university network to gigabit levels.

National learning network – a network for eLearning and collaboration

The first projects associated with the National Learning Network were started in 2002. They include the following elements:

- Digital content and digital services (cf. Picture files, video, programmes, academic objects)
- Standards for eLearning
- Network for educational innovation, skills enhancement and sharing of experience
- Infrastructure for learning and online interaction
- Joint technical solutions

As a stage in the work on the National Learning Network, the web portal utdanning.no was launched in the spring of 2003. The first phase is concentrated on higher education. New services will be added as the date draws near for the launch of the second phase in August of 2003.

Digital learning resources

In 2002, the Learning Centre began to develop 17 digital teaching aids in mathematics, natural science and environmental subjects, English and a number of independent creative projects. The number of applicants shows a clear trend: private and public teaching aid players at different skills levels wish to collaborate on teaching aid projects. In order to expedite the development

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[38] Figures from the year 2000 (OECD 2002)

[39] IT-management, Denmark 2002

[40] Figures from the year 2000 (OECD 2002)

[41] Electronic-commerce Business Impacts Project (OECD), SND/SØK-Verdi (Verdiskapningsstudien)/Gunnar Christensen, Leif Methlie, Leif Jarle Gressgård et al, 2001-2003

of forward-looking digital learning resources and help develop good resources at all educational levels, the Government has encouraged these collaborative efforts. The work on digital learning resources continues has continued in 2003.

Skills enhancement for teachers – a fundamental call for change

The development of teachers' IT skills is a prerequisite for schools looking to the future. In the autumn of 2002, a major campaign got underway, with the purpose of intitiating the scheme. A number of schemes were introduced, such as Teacher-ICT and the Norwegian online schools' further education programme. This is a 3-year commitment with a target of providing 40,000 teachers with IT training to bring them up to the required standard. These initiatives will be reviewed and assessed during the course of the year.

R&D in IT and learning – setting a trend in Norwegian and international R&D projects

In 2002, commitments to R&D and research in IT and learning yielded a wealth of knowledge surrounding academic and educational use of IT at various academic levels. This area was promoted to higher priority in 2003. The focus was on the impact of IT on the process and benefits of learning, as well as feasible IT integration harmonised with teaching practice.

The research and skills network for IT in education – the ITU at the Universitiy of Oslo – is a key player in the action plan's R&D commitment. The ITU will assist pupils, students and teachers in deploying IT and thus become co-developers of IT in educational practice. The ITU is an intrinsic part of the UFD's IT policy. Efforts are concentrated on national R&D programmes, studies, R&D projects, international collaboration project and other activities.

Three schemes are particularly worth mentioning:

- **PILOT** (Prosjekt for Innovation in Learning, Organization and Technology) is the most compehensive Norwegian commitment assocated with pedagogisk bruk av IT i skolen [the educational use of IT in the schools]. 120 elementary and lower secondary schools in nine counties are involved. PILOT has been thoroughly documented and analyzed by means of impact assessment. Tentative results show a positive link between the use of IT and education benefit. Moreover, IT is a vital catalyst in schools' general work on development .
- **PLUTO** (Programme for Techer Education, Technology and Adaptation) focuses on establishing new trends with IT in teacher education. It currently consists of 10 projects spread over 8 institutions. The educational, technological and organisational development and adaptation of teacher training in IT usage are core elements of the projects.
- **SITES** – Second Information Technology in Education Study. SITES is led by Standford University in the US; it was initiated by the International Association for the Evaluation of Educational Achievement (IEA). The project consists of three modules. In module 1, the concentration of PCs and the participating countries' infrastructure were studied. Module 2, which has ran from 2000 to 2002, was a qualitative study of innovative educational practices involving the use of ICT. Altogether there were 28 countries participating in this module; they contribute a sum total of 174 case descriptions. Norway is participating with 11 cases spread over elementary, lower secondary and upper secondary schools.

IT AS A CATALYST AND INSTIGATOR

In terms of IT's impact on classroom teaching and learning, a number of well documented circumstances exist, some of which we are only now beginning to get a clearer picture , and yet other circumstances for which there is insufficient documentation.

It has been well documented by several years of research that:

- Pupils' motivation for the work of learning increases with the use of computers
- IT works like a catalyst to promote organisational modification and adaptation processes.
- School development and adaptation through the use of new technology takes time and is dependent on a number of factors concerning the school as an organisation. Some schools meet with more success, which is due to a "positive self-sufficient school culture"
- One important factor that has a bearing on learning achievements is the exploitation of technology in terms of its potential and the value it can generate, e.g. through process-oriented writing, access to information, simulations, or communication outside the classroom.

- ICT creates more "room to manoever" for pupils, enabling them to apply themselves to their subjects in a varied and differentiated manner.

In recent years, we have begun to see more clearly that:
- Pupils who are active IT users do markedly better than other pupils on standardised tests in mathematics, natural science and English.
- The educational use of IT has a positive effect on pupils' production of knowledge
- First-graders who are learning to read and write on computers learn how to read and write more quickly
- IT stimulates the devevlopment of metacognative skills, such as reasoning, problem solving, "learning to learn" and creativity.
- Increased use of IT reduces teachers workload and makes their work more efficient
- The use of digital maps helps pupils learn and structures that learning
- The use of e-mail and a learning platform (LMS) can strengthen cooperation between home and school.

We have started to realise the significance of the following:
- To develop good indicators for tracking the effects of learning.
- How IT is used and how it sets the terms in specific progressional contexts
- To develop learning resources adapted to the new potential that technology offers
- How digital skills and teaching are involved in every aspect of the schools' activities.
- How to facilitate strategies for inhibiting a "digital divide".

IT in education – A critical perspective

By Professor Sigmund Lieberg, University of Oslo *)

What are the results and status of the extensive, long-term, systematic work done on IT that has involved many players in the education system and which unresolved questions remain? Have we got anything for our money or have we, to all intents and purposes, created playgrounds for missionaries for technological and educational change?

The Norwegian list of achievements in the field of IT in education is long, well documented and genuine:
  - At the cutting edge in terms of access to equipment and infrastructure
  - Systematic, goal-oriented planning documents
  - Significant financial investment
  - Deliberate concentration on knowledge development and documentation
  - Conscious relationship between technology and education in visions and rhetoric
  - Combination of a top-down and bottom-up approach with opportunities for grassroots initiatives as well as centrally initiated projects
  - Open, democratic processes associated with large portions of the work

So why is it that we are still left with the impression that the investment cannot be said to be thoroughly successful vis-à-vis the results it has achieved? My critical comments regarding the current status must not create the impression that the investment being made in IT in education has not been, and is, positive in many ways. The work on IT in education is an exciting chapter in the history of Norwegian education with a lot of activity, entrepreneurship, leadership, and educational and academic renewal. The big picture is characterised by variation and diversity. It has created some strong environments, competent expert resources and had some influence on individual schools' organisation and teaching work. On the other hand, IT has so far not had that great an effect on the work and results of schools, teachers and pupils. What will happen in the long-term remains to be seen. This does not necessarily indicate a small return on a large investment. However, the investment has not been successful so far from the point of view of the ambitions regarding introducing IT into all education and integrating IT into schools' teaching work.

I will look at six areas in particular as reasons for why even though the results are good they are insufficient:

1. The failure to anchor IT properly in the curriculum has resulted in the work on IT having insufficient legitimacy in schools.

2. The lack of national requirements concerning the IT skills pupils should develop makes schools' IT work a matter of chance and dependent on people or projects.

The actions plans for IT have been developed independent of the curriculum. The education reforms of the 1990s had an agenda other than IT. Neither the old nor the new curricula lent IT any particular legitimacy. The action plans for IT represent a genre of policy document other than those teachers are used to relating to in their work. It is therefore unnatural to expect teachers to view such documents as important to their work.

The curriculum barely reflects the increasing degree to which IT is part of children's and adolescent's cultural lives and surroundings. While its view of technology is imprecise, it is clear that IT is viewed from the perspective of being a tool, while the focus of international education policy involves an education perspective as well.

The curriculum contains an unclear, incidental, not very uniform, and somewhat outdated use of field related terms. Teachers can form any perception whatsoever of what is meant by the respective statements. This means that one could just as easily read IT out of the curriculum as into it.

Pupils' IT qualifications therefore depend more on the development opportunities they are presented with in their social and cultural environments outside school than through contributions made by schools. The contribution of schools to doing something about the "digital divide" has therefore not been as great as it could have been.

New initiatives in curricula ought, among other things, to build on the IT experiences pupils have outside schools, which form part of their IT skills. Clear goals ought to be set regarding what pupils are actually expected to learn with respect to skills and knowledge within this new field that many call the fourth basic skill. All pupils should possess the ability to critically manage and orient themselves in a large selection of data, both mentally and technically, develop skills that enable them to filter and evaluate information and form valid opinions on the basis of this, as well as the ability to evaluate the social consequences of online publishing and distribution and responsibility vis-à-vis each other. As for other basic skills, routines must be established that enable the results of schools' work within IT to be assessed.

3. Investment in teacher training and teachers' skills – extensive but insufficient and too short-term

There is a clear understanding in most European countries and the USA of how important it is to invest in teacher training and teachers' skills as a basis for a long-term IT related restructuring of education.

The development of teachers' skills is a demanding job. Far more knowledge about increasing teachers' skills vis-à-vis IT is required than we currently posses in order to ensure the effects

on teachers' professional roles and schools' teaching work is sustainable. There appears to be an increased focus on the more subject specific use of IT and less on more general skills, something that I view as positive with respect to the long-term anchoring of IT in education.

4. Preschool teacher training and the nursery school sector – an IT free zone?

An overwhelming amount of research has over many years documented children's relationship to the new media reality. Small children are habituated to IT through games and entertainment as well as through the new habits and attitudes to new technology displayed by their parents. This presents challenges and opportunities for those institutions which bear some responsibility for the environment in which children are brought up. Skills and reflection can be stimulated here. There are opportunities for play and learning utilising new means and genres. The reason why nursery schools and preschool teacher training is such an invisible part of a large, comprehensive programme is a mystery to many. There are no academic arguments to support this.

5. The unintentional consequences of IT as a project organised investment

The organisation of the investment in IT as projects has contributed to the fact that the following up of plans has largely depended on one obtaining support for projects that are introduced as time-limited supplementary support. It is important to question whether or not the chosen model really helps to realise the goals of the action plan. Is there a danger only those selected for projects will wrestle with the challenges IT represents? Do the ambitions become unrealistic in relation to an ordinary continuation process following the end of the project period?

My assertion is that a strong project approach results in the self-reinforcement of the "chosen ones" and a significant risk of a "Mathew effect". Those who have, get. Those who get, get more in the form of money and other rewards; often in the form of participation in other projects, nationally and internationally, in addition to positive media related coverage.

In addition to this, the model leads to research readily concentrating around these "positive" choices and their "positive" development. We know considerably less about the others – those who act on their own initiative within ordinary boundaries.

If one could really support the view that this model genuinely contributes to spreading best practices, functions as a beacon and inspires others, it would be different. This is a question to which an answer should be sought and at the same time there should be an increased focus on what has happened in places where there have been no projects.

6. From a one-sided, constrained argument about benefits to a balanced argument about benefits and costs

The investment in IT has to a certain extent been characterised by "magic dust" rhetoric with a one-sided emphasis on the necessity and benefits argument. The cost argument has largely been ignored. We have argued in favour of IT's significance in relation to traditional social and education policy goals such as equal opportunities, availability, pupil centred education, and a modern view of teaching. The focus has been, and is, on making the technology available. We have not worried much about the possible consequences of what an absence of access to IT really means. How does the absence of the Internet affect the quality of education provided in the 5 per cent of schools that do not have Internet access? Does it mean anything at all? What educational and other benefits result from the Internet and broadband for those who invest in them?

There is a clear tendency regarding the over reporting of IT as a quality in itself without reference to the relationship between the investment factor and dividend. Can we be satisfied with findings that report tendencies to increased benefits from teaching after spending one billion Norwegian kroner over the last few years?

We must focus on activities and research that help to:
- clarify the short-term and long-term benefits and expenses associated with adopting IT
- deliver academic learning benefits, effectiveness and work related motivation
- clarify teachers' effectiveness, professional qualities and work related motivations

The optimum utilisation of IT requires extensive changes to and investment in organisation, skills, equipment and infrastructure. It is not reasonable to argue for continued extensive national investment unless one can document effects. The investment in IT requires a long-term perspective and prudence, as well as systematic and critical reflection.

IT in education – some challenges

By Kristin Clemet, Norwegian Minister of Education and Research

By the end of this year, we will have spent around one billion Norwegian kroner on direct public investment in ICT in education. This money has been spent on a broad range of initiatives:

  - We have invested considerable resources in developing teachers' skills - both during teacher training and in the public schools. During the period 2002-2004, up to 40,000 teachers will be offered upgrading courses in the educational use of ICT.

  - We have invested in the development of digital teaching resources and services. The new education portal (utdanning.no) will make searches for resources easier as well as encourage developments in digital content as educational and teaching aids.

  - We have been looking for ways to exploit ICT within education and teaching. A major project, PILOT, (Project Organisation in Learning, Organisation and Technology) involving around 120 schools throughout the country is in its final stages at the moment. We are expecting a lot from the results.

  - We have channelled considerable resources into the Norwegian school system through the HØYKOM School programme with the aim of forging ahead with broadband roll-out and encouraging broadband deployment.

These initiatives have paved a long and winding way for us, finally towards integrating ICT into the school education, even though we still face a number of challenges.

We will redouble our efforts to ensure that teachers, school administrators and others involved will possess the skills required to integrate ICT into the education system. At the same time, we simply must take a broader perspective on the subject of ICT and skills. Reading, writing and arithmetic are the traditional three "Rs", firmly entrenched within our current school curriculum. These are something every pupil has to master. The time is now ripe to look at how we can integrate what are often termed digital skills into the curricula, classroom teaching and a lifelong learning perspective. Digital skills build on basic skills, but they also involve other skills when it comes to using ICT to search for and develop knowledge, analytical abilities, presentational abilities, communication skills and an ability to work with others.

The HØYKOM School project increased access to, and the utilisation of, broadband in schools. This work will be continued. There are still many schools, especially primary and lower secondary schools, which do not have broadband access. Limited access to broadband must not be allowed to hinder the schools' educational potential.

We must continue to purchase large amounts of diverse digital content as an investment in teaching, which builds on experience gained through digital teaching aids schemes at schools.

This area presents many challenges:

  - An improved market with sustainable business models to boost the development and management of digital content

  - Well-functioning collaboration between public and private players. A number of countries are having a hard time struggling with this, and only a few have succeeded so far.

This autumn, we will be setting up a Forum for Public-Private Collaboration with the objective of getting to grips with this matter.

  - Schools, teachers and pupils are all capable of achieving far more than is the case at the present as working content developers while they undergo training. The challenge facing us now is how to make the process as easy as possible and inspire by motivation. Technology is constantly providing us with simplified methods for exchanging, downloading and recycling digital content created by others. This is an exciting prospect – and should boost quality levels of ICT-based Norwegian education.

As we are winding up large projects such as PILOT, we have an opportunity to look ahead, and I would like to touch on three central areas. On the research front I would like to point to three important areas:

  - We have not had enough practice yet at classifying and drawing on experience gained from research into ICT and education. A summary of the conducted research will soon be released, so this will help us in identifying new, exciting themes for research.

  - While attending the presentation of the results for the Norwegian part of the PISA survey, someone pointed out that Norwegian schoolchildren do not appear to have particularly robust learning strategies. This could lead to problems, especially in the case of project work and ICT. We must look into these issues and continue our study of how ICT can help Norwegian schoolchildren's and students' concentrate and find strategies for learning to learn.

  - The PISA survey also indicated that Norway only scores average marks on the benefits pupils gain from learning. The British Impact2 study demonstrated a positive correlation between investment in ICT in education and learning on the one hand, and results in standardised national tests on the other. I am of the opinion that the introduction of similar tests which are tailored to the Norwegian school system is essential. The challenge facing us now is how we can make optimal use of our completed project on ICT in education, with a view to enhancing quality levels throughout the entire educational system.

NORWEGIANS ARE HEAVY IT USERS, ALTHOUGH THERE ARE DIFFERENCES

Norwegians have extremely good access to the Internet, and use it actively. But with an accessibility rate of 97 per cent among teenagers younger than 20 and 88 per cent access for people under 40, we can soon be qualified to say that everyone has accesss online. Out of a total population aged over 13, 75 per cent had online access in March 2003. 55 per cent of everyone with online access use the Internet on a daily basis, but disparity still remains between genders, age and geographic differences.[42] 76 per cent of Norwegian households have a home PC so around 1.3 million households or thereabouts are connected online at home.

Being able to surf online for information is the most important motivation factor for connecting online, or for people wishing they could, followed closely by being abøe to send and receive e-mails.

The ability and desire to use the Internet appears to be more of a standing out in the crowd factor rather than a mere practical connection to an electronic infrastructure.[43] New obstacles and divisions also emerge with daily application of these technologies, e.g. if using an extremely low universal design on priivate and public websites is still and no insidious banner popups occur.

There is a marked difference in gender for a number of areas in technology and media. Men have gone in for broadband to a much greater extent than women over the past year, men use their mobile phones more frequently for less popular services such as WAP, mobile connection to PCs or Internet and e-mail, and men have more PDAs. The usage volume of advanced or extra services for mobile phones and is directly linked to age.
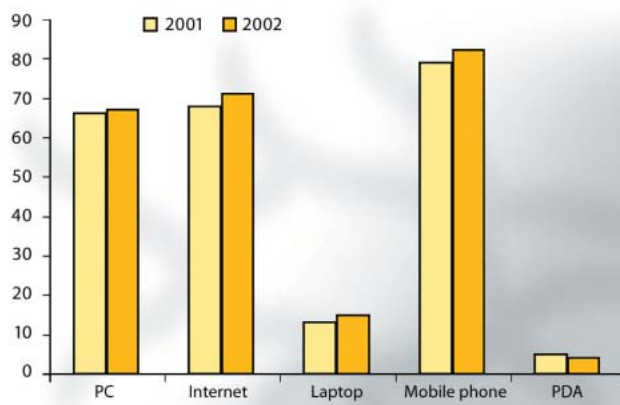
42% of those not planning to get connected to the Internet say they can't afford it. 12% say they have the Internet at work and 9% say that the initial layout of buying a computer is too expensive and 6% say it's too expensive to use.

Figure 17 The population's access to IT as a percentage. Source: TNS Gallup

The National Council for Norwegian Children's and Youth Organisations [Landsrådet for Norways barne and ungdomsorganisasjoner (LNU)] is an umbrella organisation for 70 different children's and youth organisations in Norway.
Several of these organisations are designed for, and run by, young people from ethnic minorities. Children from these backgrounds seldom have access to computers or other high-tech equipment, which leads to their being deprived of the same opportunities as other children to keep abreast of advances in technology. It is of vital importance that the Government uphold their policy which has set a target to bridge the gap between children from ethnic minority backgrounds and other children. It is important that progress within technology does not widen the divide even further between social classes, but it is better to get involved and thereby tone down any differences between children from minority backgrounds and other children. Youth organisations will team up with other government institutions to offer courses and various educational schemes to those within society from ethnic backgrounds that really need this at courses and receiving backing from local authorities and other government institutions, so that they can help prevent discrimination.

Seniornett Norway and eNorway.

It is vital that our e-society embraces our more senior citizens as well.

"Internet usage during the past month" in the age group 60+ has risen from 9 per cent to 20 per cent during the time the Seniornett network has existed. Seniornett education centres for the elderly, formal and yet informal, have been set up all in towns right across Norway.

Internet usage is still far less widespread among senior citizens than among younger generations. Recent experience obtained at the training centres suggest that the novice skills threshold for starting a course (requirements for prior knowledge) must be dropped quite significantly in relation to what was previously the norm for going on one of these courses. Seniornett will pull out all the stops to devise more pedagogically-suitable courses for senior citizens.

The annual SeniorSurf Day (arranged for the third time) has functioned as a kind of local grapevine. Senior citizens in the target group of 60+ have found out about the Internet and how they can make best use of the facilities there. Local groups have offered premises at which the club can meet. We have been keeping an eye on developments via our website. . We want to encourage information exchange so that local groups can swap experiences.

The SeniorSurf Day has expansion plans this year and the venue will be the Internet Café at Norway's Trade Fair at Skedsmo on 12 September between 11.00 a.m. and 2.00 p.m.

The lack of knowledge among senior citizens could mean that simpler services provided by local authorities are not used. We would also like to provide relevant product information from businesses.

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[42] TNS Gallup, Interbuss 1/2003.
[43] Digital divides, challenges and strategies, Ivar Frønes, Fagbokforlaget 2002 and "Report on IT which is now Utredning om IT in academic bookshopssom fag i høyere utdanning", Norwaysnettrådet, oktober 2002

4 Attractive content

Targets:

- *Good access to quality, diverse digital content must be in place for the Norwegian market or with export potential.*
- *The Norwegian content industry should be internationally competitive and there should be competition and diversity vis-à-vis the production and distribution of digital content in Norway.*
- *Content production should contribute to modernising the public sector and ensuring democratic participation.*
- *Information and attitude- building work should contribute to counteracting illegal and harmful content on the Internet.*

HIGH DEMAND FOR CONTENT, BUT LIMITED PRODUCTION OF UNIQUE ELECTRONIC CONTENT

The proportion who respond that the Internet is very useful or that the Internet is quite useful is increasing. More than half of those who use the Internet state that the medium is very useful. There is little difference between genders, though those over 60 years old believe the Internet is less useful that other age groups. Listening to the radio via the Internet is a popular service and 21 per cent say they have used this service in the last 30 days. Radio is an important part of the expansion of Norwegian online content. Some stations are increasingly offering archives of previous broadcasts and in this way contributing to the reuse and improvement of Norwegian produced content. One in four have downloaded music from the Internet.

The production of unique digital content in Norway is still limited. The private market's main focus is still on providing existing content with a digital packaging in order to transmit it through different channels.

The largest players in the market for digital content are businesses that sprung from the media industry, especially newspaper or magazine publishers. The considerable demand for music and films in the grey market is primary directed at foreign products. This picture will probably change markedly when widely distributed legal transmission channels for such products develop.

Online linguistic diversity is developing positively. Microsoft's implementation of the Sami character set is an important link in meeting the challenges associated with Sami in the information society. Furthermore, more of the mainstream office support software is available in Nynorsk (New Norwegian) – as both open code and proprietary solutions – following demand form private and public users. A similar development has taken place online where, among other things, the web browsers Opera and Mozilla are available in Nynorsk versions. One important factor in preserving linguistic diversity online is the possibility of

simultaneous searches of websites in both forms of Norwegian in a single search depending on the form of Norwegian search word. The development of the ParallellSøk software which, among other things, is used by Voss Council, is an example of positive development in this area. Language technology such as computer supported translation between Nynorsk and Bokmål (the two forms of written Norwegian) – has been adopted by public services and could help to achieve the objectives regarding the use of the different forms by public services.

The broader distribution of open source may also enable minority language communities to develop their own solutions more easily, independent of the suppliers' willingness to deliver.

THE CONTENT MARKET IS BEING DIGITISED

Schibsted, Orkla and A-pressen control 55-60 per cent of newspaper production in Norway and thus also many of the country's leading suppliers of digital content. Telenor is another important content supplier through, among others, the companies ABC Startsiden, Din Side, Djuice and its interest in A-pressen.

The online digital content market is expected in 2007 to be worth between an estimated NOK 900 million given a worst case scenario and NOK 2,250 million given a best case scenario[44].

Several players have developed micropayment solutions. The largest Norwegian ones are Payex, Buypass, eMynt, SmartPay and Contopronto. No figures are available regarding the market values of digital content purchased via micropayment solutions, however reports indicate that the market is growing.

The digital content market for the *mobile phone platform* was estimated to be worth approx. NOK 400 million in 2002 in the "On the house or pay to play" report. The Norwegian SMS market is very well-developed in relation to other countries, including Nordic ones: while Norwegians spend an average of SEK 45 on SMS services per month, Swedes spend approx. SEK 14.

Rapid growth in online advertising

The "On the house or pay to play" report calculated that the Norwegian advertising market vis-à-vis the fixed-line Internet was worth around NOK 250 million in 2002. At the same time, more than 1,000 players earn income from online advertising. In the USA we know that the 10 largest of a universe of more than 9,000 account for 80 per cent of advertising income. There are no equivalent figures for Norway, but little indicates that the trend is significantly different in Norway. If one assumes that

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[44] Calculations carried out by Teleplan

Norwegian advertisers behave in the same way, one can assume that most of the online advertising income is earned by the 2-3 largest websites. The total market for online advertising is in 2007 expected to be worth between NOK 550 million and NOK 800 million[45].

The media's earnings base increasingly involves online services. Large players such as Schibsted have seen a marked decline in earnings from paper based small ads, while the equivalent online service Finn saw an increase of 40 per cent in operating income between Q1 2002 to Q1 2003[46]. This situation entails significant challenges for media groups during the transition to more online-based services and incomes.

Table 3 Net advertising turnover of 28 big websites in Norway Q1 2003 in NOK 1000's. Source: INMA/Nettforum[47]

Total turnover, Q1 2003	115,000
Brand advertising, Q1	81,420
Small ads, Q1	33,499

The period from January to March saw growth of 20 per cent.

Of the advertising channels using media bureaux, TV and the Internet were the only ones that saw growth from Q1 2002 to Q1 2003, and the growth in ordinary advertising via the Internet is particularly rapid and high at the moment. The Internet has a good chance of becoming the largest advertising channel in Norway after the daily press, weekly press and TV during the course of 2003.

Table 4 Advertising turnover through media agencies, first four months of 2003.
Source: Mediebyråenes Interesseorganisasjon [48]

Channel	Turnover in 000's, Jan-Apr 2003	Difference from Jan-Apr 2002
Daily press	626 802	- 5.6
Weekly press	131 231	- 0.8
Trade press	26 361	- 18.0
TV	645 929	+ 5.4
Radio	66 106	-2.1
Internet	54 339	+ 47.9
Cinema	23 396	- 9.2
Outdoor	61 936	- 0.8
Other media	32 236	+ 13.8
Total media turnover	1 668 336	+ 0.4

THE GOVERNMENT IS A SIGNIFICANT CONTENT PROVIDER

The government is also an important content provider through, among others, NRK, Norsk Eiendomsinformasjon AS, the Norwegian Meteorological Institute, the National Library of Norway, the Norwegian Mapping Authority, and in its interests in Telenor. Data available for direct purchase through digital information products from Norsk Eiendomsinformasjon AS, the Brønnøysund Registers, the Norwegian Mapping Authority and Statistics Norway earned a total of NOK 105 million[49].

The Pira report[50] from 2000 estimates the total value of official information to be worth around EUR 68 billion a year in Europe. At the same time, is states that official information is a significantly under exploited resource[51]. Public investments in the production of information amount to EUR 9.5 billion. By way of comparison, twice as much has been invested in the USA. In Sweden alone the value of public investments is estimated to be EUR 535 million, while the value of these investments in official information is valued at approx. EUR 3.6 billion. If we crudely translate these figures to Norway, we end up with investments in official information amounting to around NOK 2 billion, resulting in a value of around NOK 14 billion.

CHILDREN LIVE THEIR OWN LIFE ONLINE

SAFT is a European cooperation, which published its first report in May 2003. SAFT 's mission is to create European collaboration to disseminate knowledge about the safe Internet use for children and teenagers.

The report illustrates the huge gap between what children actually do on the Internet and what their parents thinks they are doing.[52]

- 83 per cent of parents said they often surfed the Internet

  with the children, but only 24 per cent of children registered that this had even happened
- 40 per cent of the children asked had seen porno on the Internet with intent or by accident
- 25 per cent of the children had been sent pornographic material
- 30 per cent of the children had seen websites with violent content, although only 15 per cent of their parents believed they had seen it
- 40 per cent of the children, when asked who they had chatted with online, said that people they had met only on the Internet wanted to meet them in person later,
- 10 per cent of the children had met people this way, while only 2 per cent of parents believed that they really had met them. In half of the occasions the children had taken a friend with them to meet the person

SAFT/MMI's survey on opinions on Internet use conducted in August 2002 revealed a great need for information on children and the Internet, and opinions on Internet use. The survey on Internet use in August 2002 revealed a huge need for information on children and the Internet, e.g. information brochures on

[45] Calculations carried out by Teleplan in the report "On the house or pay to play".

[46] Journalisten, 9th May 2003, www.journalisten.no/

[47] Bransjeorganisasjonen for interaktiv markedsføring (INMA)/Nettforum (Anfa Research), June 2003. Of the large media companies notably, A-pressen and Adresseavisen are not included.

[48] These figures show the organised turnover through media bureaux and are estimated to cover 80-90 per cent of the market in Norway. The daily press figures have been criticised in particular for covering too little of the genuine market, and the overall figure for the daily press, including turnover outside media bureaux is claimed by "Tre Store" to indicate a small amount of growth, not a decline. Published, among other places, at:
< http://www.kampanje.com/00/36/01/1.html >.

[49] Figures from Teleplan

[50] Commercial exploitation of eEurope's public sector information. Pira International Ltd. 2000

[51] A draft EU directive regarding access to the public sector's documents for commercial use is expected to be adopted at the end of 2003, beginning of 2004. The implementation of the directive is important with respect to both increasing the added value of the content business and laying the foundations for national infrastructures in various fields.

[52] The report builds on an interview with more than 10,000 parents and children aged 9 – 16 in five countries. www.saftonline.no

children's need for information on the Internet and children, and be taught some common net sense and how many technical filtration software don't work well

The saftonline website was opened in April at saftonline.org, which is a resource centre for safe use of the Internet.

Undesired e-mail is a growing problem

Undesired mass-distributed e-mails (spam) is a growing problem. This is particularly the case when e-mail has undesired pornographic content and when it leads to the misuse of the resources of the recipient and the infrastructure provider. Spam is generally not permitted in Norway. In a survey carried out by Symantec, dinside.no and digi.no[53] in October 2002, 53 per cent of those asked said that they receive between 1 and 9 undesired email messages every single day, which is quite a considerable burden on e-mail systems.

[53] Symantec/Digi.no/Dinside.no, October 2002

5   A modern public sector

Targets:

- *IT shall contribute to a more efficient completion of tasks and a better organized public sector.*

- *All municipalities and government agencies shall provide customized electronic services which will simplify the users' daily work and promote democratic dialogue with the public.*

- *Before the end of 2004 all government agencies must be capable of receiving electronic reports from the trade and industry sectors.*

- *The public sector shall use its role as a major customer to promote the development and use of IT-based products and services in society.*

THERE IS SIGNIFICANT POTENTIAL FOR IMPROVED ORGANIZATION AND MORE EFFICIENT PROCESSES

There are many projects where IT plays a central role in the promotion of improved organization and efficient completion of tasks. A critical precondition for success is that the projects incorporate organizational transformation processes. Experience also shows that another critical precondition is that the projects are strongly supported by the organization's management.

The Ministry of Labour and Administration (*Arbeids- og administrasjonsdepartementet*) presented a new strategy for ICT in the public sector in February 2003. This strategy emphasizes the importance of setting up systems for the reception of electronic reporting, recycling and coordinating public data and the coordinated use of PKI.

The municipalities also consider IT to be a key tool for renewals, adjustments and efficiency improvements. IT is used on a large scale in most operational areas.[53] It is most used in administration and technical departments, and least used in the nursing and care sectors.[54] 94 per cent of the municipalities state that they have electronic journal systems. 46 per cent state that they have an IT strategy which includes objectives and guidelines for the municipality's acquisition or use of IT.

Few municipalities cooperate on IT-based tasks. They report a number of barriers which impede cooperation of this kind. 40-50 per cent of municipalities mention culture, tradition and physical infrastructure as the main reasons, while 20 per cent mention problems associated with expenses, data security and skills.

MOST PUBLIC ORGANIZATIONS OFFER BASIC ELECTRONIC SERVICES

The public is showing an increasing tendency to prefer the telephone and Internet as the means of contacting the public sector. 56 per cent of the population has visited government websites. The purpose of these visits is still principally for simple information-seeking (48 per cent). But the use of the Internet for submitting tax returns is a good example of how it can be used for more than seeking information.

Figure 18 Electronic filing of tax returns
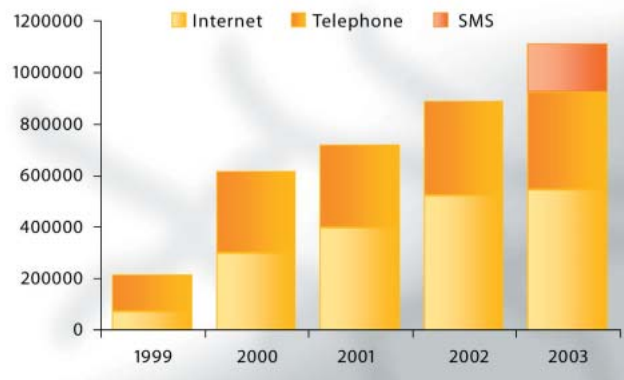
1.113.000 Norwegians chose to file their tax returns electronically: 544.000 on the Internet, 378.000 by telephone and 191.000 sent a text message. This is equivalent to an increase of 25 per cent on last year and means that one in three Norwegians filed their tax returns electronically.

There are clear social and demographic differences in the use of public sector electronic services. People over 45 use electronic services far less than those who are younger. The use of these services increases sharply with more income and education. There is also a preponderance of male users.

Useful government websites

In collaboration with Vestlandsforskning and Statskonsult, the public sector portal norge.no is evaluating government websites to encourage higher quality. The assessment is being made on the basis of quality criteria for government websites. During

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[53] Statistics Norway, Use of ICT in the Municipalities 2002. Unrevised figures. 394 out of 434 municipalities answered the survey.
[54] ICT in the Municipalities. Kommunenes Sentralforbund 2001/2002.

NorStella

NorStella finds it unfortunate that the Government has not admitted the fact directly that implementation of its public sector IT strategy must be based on open standards for the exchange of data and information. In plain words, this means that government offices must base their IT projects on such open standards as EDIFACT, ebXML and WebServices.

In NorStella's experience, many European governments have a clearly stated policy that such standards must be used as a basis for developing the public sector and making it more efficient. We also note that the methodology we have worked out for implementing such standards, and that was put into effect as the Open Infrastructure program, is being embraced by a number of different EU projects. It would be highly unusual if the same methodology were not to be used as a basis for national projects.

What we miss in the eNorway plan is a clear-cut initiative, as well as a recognition that the comprehensive government IT architecture is the key to reaping the benefits of the eNorway plan for the public sector. Such an initiative will primarily have the following effects:

- It will make it easier to cooperate electronically between two agencies, which is often necessary for achieving a better provision of services.
- It will make it cheaper to implement IT solutions, since there will be less need to replace professional systems and other IT solutions.
- It will stimulate competition between IT suppliers, and government agencies will thus become less dependent on certain ones.
- The value of IT investments will rise, due to a longer lifespan and enhanced functionality.

spring 2003, 606 government and municipal organizations had been assessed, and only two were awarded the highest score of six stars[55]: Kvam Municipality and Statistics Norway.

Norway's 10 best providers of government online services include in order of rank:

1. Kvam Municipality
2. Statistics Norway
3. Høyanger Municipality
4. Norwegian Competition Authority
5. Oppegård Municipality
6. Sauda Municipality
7. Tysnes Municipality
8. Bergen University College
9. Ministry of Agriculture
10. National Archives of Norway

The assessment shows that government websites are slightly better than municipal websites. The results show wide variation in user-friendliness and accessibility. Very few government websites satisfy the WAI-[56] standard for accessibility to the general public.

Active users, but progress is slower than expected

Public electronic services are often categorised by the extent of user orientation and complexity. An indication as to the complexity can be obtained using the service steps[57] which describe the development from the simple information services

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[55] Quality assessment of government websites. Vestlandsforsking and Statskonsult, 2003. Criteria are based on accessibility, user adaptation and content
[56] Web-Accessibility Initiative from World Wide Web Consortium. WAI-demands demand no barriers be built around vision, hearing or physical and cognitive requirements
[57] ICT in government 2002, Circular:2002:4, Statskonsult.

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in step 1 (brochure downloaded from the Internet) to services that require communication between enterprises' internal systems in step 4.

Table 4 Service steps

User orienteering / Service	Step 1: Services which contain general information about the department and its services	Step 2: Services with tailored information and simple interactive functions	Step 3: Services which enable the users to enter and retrieve information based on personal criteria. The service is linked to internal IT systems in the department.	Step 4: 'electronic administration' Services and network functions for collaboration with other departments and other institutions in society.
	Publishing 'Brochures on the Internet'	Target group oriented communication Simple interactivity	Individual communication Vertical integration	Interaction and operating in both directions Horizontal integration
	Complexity / Potential gains			

A recent survey conducted by Vestlandsforskning commissioned by The Norwegian Directorate for Public Management [Statskonsult] and norge.no in 2003 showed around 45 per cent of government agencies achieved Step 2 in the Service Steps. This implies that they have developed simple interactive services, such as map services or provide forms online for downloading. The equivalent share for municipalities is 58 per cent , 24 per cent for government enterprises and 14 per cent of municipalities are positioned on step 3. However, there are few enterprises which have developed services ranking Step 4.
Vestlandsresearch ranks seven government enterprises in Step 4 and these are the following:

- The Labour Market Administration
- The Church Council
- Kredittilsynet
- Norwegian Coastal Administration
- Office of the Auditor General
- Norwegian State Educational Loan Fund
- Norwegian Public Service Pension Fund

There are likewise three municipalities qualifying for Step 4:

- Finnøy
- Lillesand
- Oppdal

International comparisons

International comparisons show that Norwegians are at the forefront in terms of getting in contact with the authorities online. Norway is also at the forefront for using advanced services such as soenlos\ading forms and reporting data directly, eg with self-assessment forms.

Figure 19 Maturity index for development of public electronic services. Source: Accenture 2003
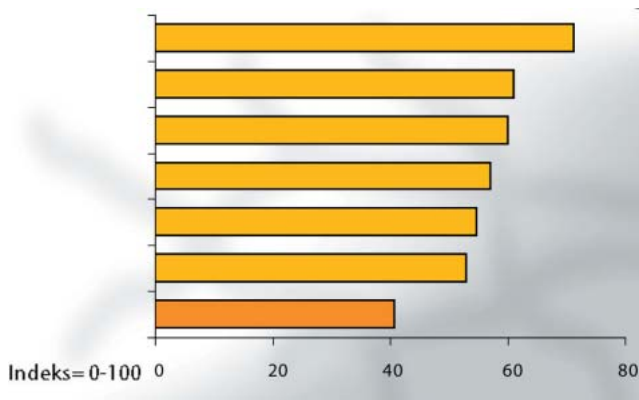
In an international survey from April 2003, conducted by the firm of consultants, Accenture, Norway did very badly in terms of developing public electronic services. The survey is based on the level of development of services and Norway altogether ranked 16th out of 22 countries covered in the survey. This is a clear drop. In 2001, Norway ranked 4th in a similar serviceand last year dropped to 13th place. The tendency among the other Nordic countries is the reverse. Canada came out top as the country with the best government online services according to the survey. They have invested heavily in the smart card as did Finland and Danmark with a digital signature for citizens.

Brønnøysundregistrene

Status and challenges from the perspective of the Brønnøysund Register Centre (*Brønnøysundregistrene*)

The Brønnøysund Register Centre has considerable potential for the exchange of electronic documents with its users. In order to realize this potential, we need a practicable solution for signing. This involves a number of challenges:

- The solution must be easy to use
- The solution must be profitable
- The solution must not commit users to a single supplier

The solutions that are currently available are too complicated to be widely applicable. This is because they involve a level of security which is unnecessary for most applications, and they are too expensive and commit the users to a single supplier. New developments are proceeding very slowly.

The situation we now find ourselves in with regard to this problem shares many characteristics with other attempts to establish a standard solution, such as a standard for exchanging email.

It is a challenge for the administration to submit the most appropriate specifications to the potential providers of such a solution, so as to ensure that the resulting services will be practicable. One of the requirements will be a combined service involving several issuers of certificates. It is a challenge for the suppliers to provide such services at a price which makes them profitable for the users so long as the volumes are small.

EASING REPORTING BURDENS ON INDUSTRY

A survey in 2001 showed that the Directorate of Tax and Customs Authority) together accounted for 86 per cent of the total volume of forms that were handled. After these came the National Office for Social Security (Trygdeetaten) with around 3.5 per cent. Each of the remaining 47 form-using agencies accounted for 0-3 per cent of the total volume of forms.

The AltInn[58]- project is a collaboration between the Directorate of Taxes, the Brønnøysund Register Centre and Statistics Norway to construct an electronic portal for electronic reporting of data by businesses to government agencies. AltInn will be up and running in November 2003, and will also be available for use to other government agencies.

E-PROCUREMENT IS STILL IN THE INITIAL PHASE

Acquisitions by the government, according to the latest figures from Statistics Norway, amounted to NOK 166 billion in 2001. 62 per cent of this sum, around NOK 103 billion, was spent on product investment, i.e. the acquisition of goods and services to be used in the production of further goods or services.

As of May 2003, the ehandel.no marketplace (the electronic marketplace for the public sector) has made links with a total of 15 municipalities, county municipalities and government organizations, whose combined annual operating purchases amount to approximately NOK 11 billion. The e-commerce.no marketplace is still in the setting-up phase, where the main focus is on linking up with more users and on increasing the activity among the existing users.

The development of the e-commerce.no marketplace is followed up in six-monthly reports showing the number of purchasers and suppliers. As of May 2003, the marketplace had around 2,000 users in the 15 purchasing organizations, and around 100 suppliers. On the purchasing side, 6 of the country's largest municipalities are now participating, while participants on the supplier side range all the way from two-person companies to multinational corporations.

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[58] www.altinn.no