Broadband for Knowledge and Growth

Summary of the Norwegian Government´s White Paper on Broadband, Autumn 2003.

The Norwegian Government's vision for broadband rollout is that the electronic infrastructure shall cover all parts of the country, provide competitive advantages for Norwegian industry, foster growth among knowledge-based businesses and contribute to modernisation of the public sector. Private and public enterprises need good access to the electronic infrastructure and they need to be able to exploit the opportunities offered by broadband. Content and services shall be developed in line with market developments, and organisations and individuals will require skills in order to reap the benefits of this new technology.

Use of information technology[1] has spread rapidly over the last 20 years, driven in particular by market conditions and new technological innovation. The convergence of different technologies has facilitated new applications and services, while at the same time users have called for and needed ever newer, faster and more tailored services. This has created a demand for, and provided new conditions for, technological developments. IT has become increasingly important for fostering innovation, improving efficiency and restructuring of the private and public sector. Increased transfer capacity in the electronic communications infrastructure will play an increasingly important role for innovation, efficiency and value creation in society and in industry. Like road, sea and air transport, the electronic infrastructure is becoming indispensable for most people.

In the strategy document "*e*Norway 2005", which was presented in May 2002, the Norwegian Government set three goals for its IT policy:

Creating value in industry
The expansion and use of information technology shall pave the way for creating 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 at the same time offer new and improved services to users.

Involvement and identity
Everyone shall be able to exploit opportunities within information technology, and IT shall play a role in the preservation and further development of our heritage, identity and our languages.

The Government's objectives regarding broadband rollout are as follows:

- Good offers for broadband shall be available in all areas of the country.
- Access shall be offered to a wide variety of electronic quality content tailored to Norwegian conditions.
- Enterprises shall have sufficient skills to avail themselves of and realise the benefits of broadband communication.

The specific objectives laid down in *e*Norway 2005 remain in place: All primary and lower secondary schools, public libraries and local authority administrative services shall be given the option of broadband communication at a competitive price in the course of 2005. By the end of 2003, all colleges of secondary education shall also be offered an equivalent scheme. One additional objective stated in *e*Norway 2005 was that all health enterprises should have a broadband connection in the course of 2002. This goal has now been achieved.

[1] The terms "information technology" (IT), "information and communication technology" (ICT) and "information society technology" (IST) are considered to be synonymous. The term "information technology" is used in this white paper.

1. Broadband is useful

The starting-point for this White Paper is that electronic communications networks with sufficiently high transfer capacity are playing an increasingly important role in the global economy. Use of information technology in general and broadband in particular can lead to increased competitiveness for Norwegian industry, by, among other things, fostering creativity and enhanced productivity. Broadband facilitates the organisation of production in new ways and the development of new products and services because it, among other things, facilitates automation and communication with customers. Investments in broadband and broadband applications will not necessarily provide benefits for industry, the public sector or the consumer market, however. One important prerequisite is that organisations and individual users have the skills necessary to avail themselves of the technology and to realise the benefits it offers. This applies both in respect of cutting-edge technological expertise regarding the choice of solutions and knowledge of the applications of broadband and in respect of new organisational solutions and ways of working. Management in the private and public sector must be aware of, and capable of exploiting, the opportunities available. Furthermore, it often takes time to realise such major benefits. The rollout of broadband is part of a general technological development and is one element of a process that will continue for many years. Broadband represents increased transfer capacity and thus increased opportunities for exploiting the electronic infrastructure. The usefulness of broadband and the savings it offers to individuals, and to the nation as a whole, will increase as more and more people access the Internet, and when more activities can be carried out electronically over the Internet. The OECD has pointed out that Norway reaps small but growing benefits from IT.[2]

2. Both the broadband market and needs are developing

Norway's geography and its demographic patterns present challenges when it comes to the development of modern infrastructure. Furthermore, the present financial situation facing the IT industry only invites players to a limited degree to make strategic investments regarding the rollout of the network. This is a pattern that is evident not only in Norway, but also in most other industrialised countries.

Precisely what constitutes broadband capacity will depend on user needs. For example, schools and private and public enterprises, with many simultaneous users and a need for different types of applications, will require higher transfer capacity than private households. Many of today's electronic services do not require high transfer capacity on their own, but when many users use such services at the same time, high bandwidth will be needed. Broadband technologies are still at an early stage of development, and the pattern of needs is in many ways uncertain. Needs are expected to shift in the direction of

- more extensive use of services and applications based on multimedia and live images requiring faster transfer capacity,
- more simultaneous users and
- users who will increasingly wish to *send* information, not only *receive* it.

This will increase the need for higher transfer capacity in the network. Part of the need for higher transfer rates will probably be covered by new compression technology, which means that more information can be transferred at the same bandwidth.

Owing to uncertainty concerning bandwidth development and needs, the term broadband has not been defined in this document as having a minimum transfer capacity. In this context, *broadband is taken to mean two-way communication that can transfer different forms of data and text, audio and video. The network should be able to carry new services and allow many people to use the network at the same time.*

[2] OECD 2003: Seizing the benefits of ICT: Comparative country performance and policies for review

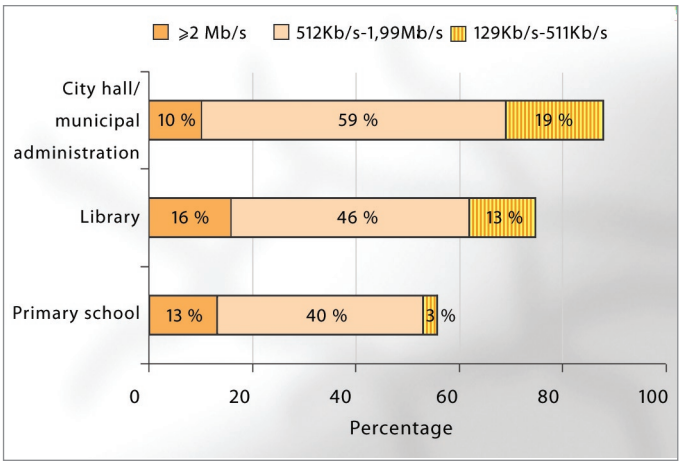

Figure 1 Subscribers connected to the Internet as of May 2003 (ECON 2003)

Figure 1 to the left summarises the transfer capacity on the Internet available to various public institutions in Norway as of May 2003. Around 70 per cent of local municipal administrations, and 62 per cent of public libraries and 53 per cent of schools had a broadband connection.[3]

Figure 2 shows broadband coverage in the private market by municipality as of May 2003 together with a prognosis for coverage in 2005. As of May 2003 the broadband coverage in the residential market was 64 per cent and per September 2002 the broadband coverage in the business market was 65 per cent.

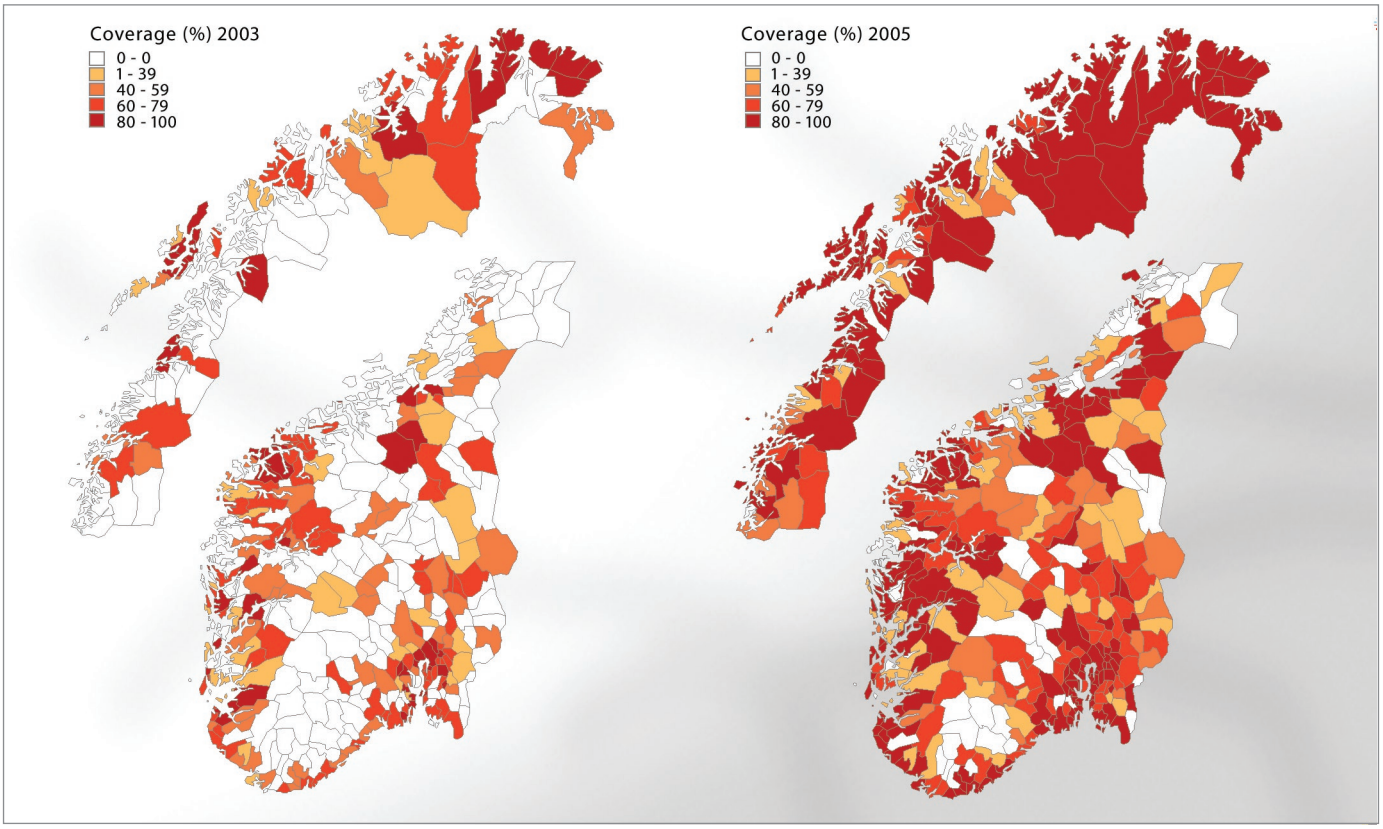

Figure 2 Current coverage and expected coverage in the private market by December 2005 (ECON 2003)

After these coverage charts were published, it appears that not all broadband projects had been included. Coverage is therefore probably better than the impression given by the coverage map. It is expected that coverage in the private market will increase to around 85–90 per cent by 2005. Further growth in the degree of coverage is uncertain, and is expected to take time. In particular, this will depend on technological developments, demand for broadband among those who have already been offered broadband, and the development of attractive services and content. In addition, a third generation mobile network (UMTS) will be rolled out in the coming years. The transfer capacity of this network will probably be at a level that will not represent a genuine alternative to other broadband technologies.

[3] In the Econ report, broadband technology is defined as ADSL, SDSL, leased lines, fibre optics or wireless (radio or satellite). These figures include transfer capacity (bandwidth) that would not normally be considered to be broadband bandwidth, but they have been included because the institutions can easily upgrade to broadband if they wish to do so.

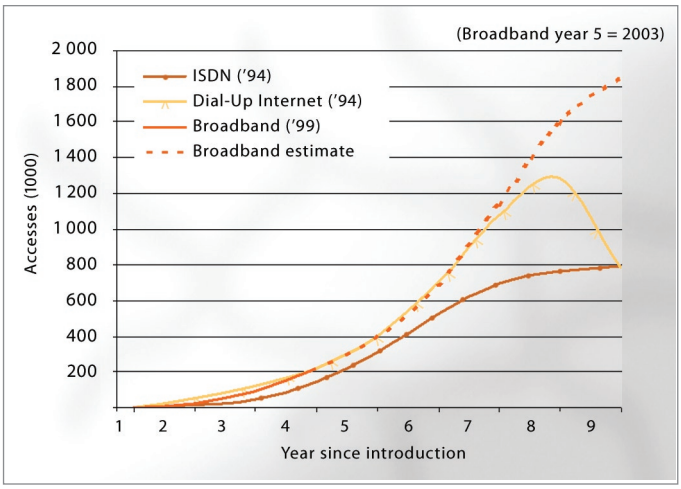

Figure 3 Growth for different telecoms products (Norsk Telecom 2003)

Even though customer growth in the broadband market in Norway displays the same rate of growth as, for example, dial-up Internet, the percentage of subscribers to the broadband network is still relatively low. In August 2003, around 16 per cent of households and 15 per cent of companies had a broadband connection. This corresponds roughly to the average of EU and OECD countries.

The overall picture therefore indicates that current broadband coverage (offer) and that expected broadband coverage in 2005 appear to be reasonably good. Thus, it may be concluded that the Government's strategy of a market-based rollout has been a success. Actual connections have lagged behind in the private sector and in parts of the public sector, however, but now appears to be developing more rapidly. Owing to uncertainty regarding technological developments, however, it is still uncertain how large a part of the country the market will eventually cover.

Comparisons with other Nordic countries show major individual differences in the speed of developments. In December 2002, Denmark and Island had 97 per cent and 86 per cent coverage, respectively, while Finland, Sweden and Norway had coverage of 75, 75 and 60 per cent, respectively. It is estimated that coverage in Norway will increase to 85–90 per cent during 2005. Coverage here is measured as the percentage of households who have been offered broadband.

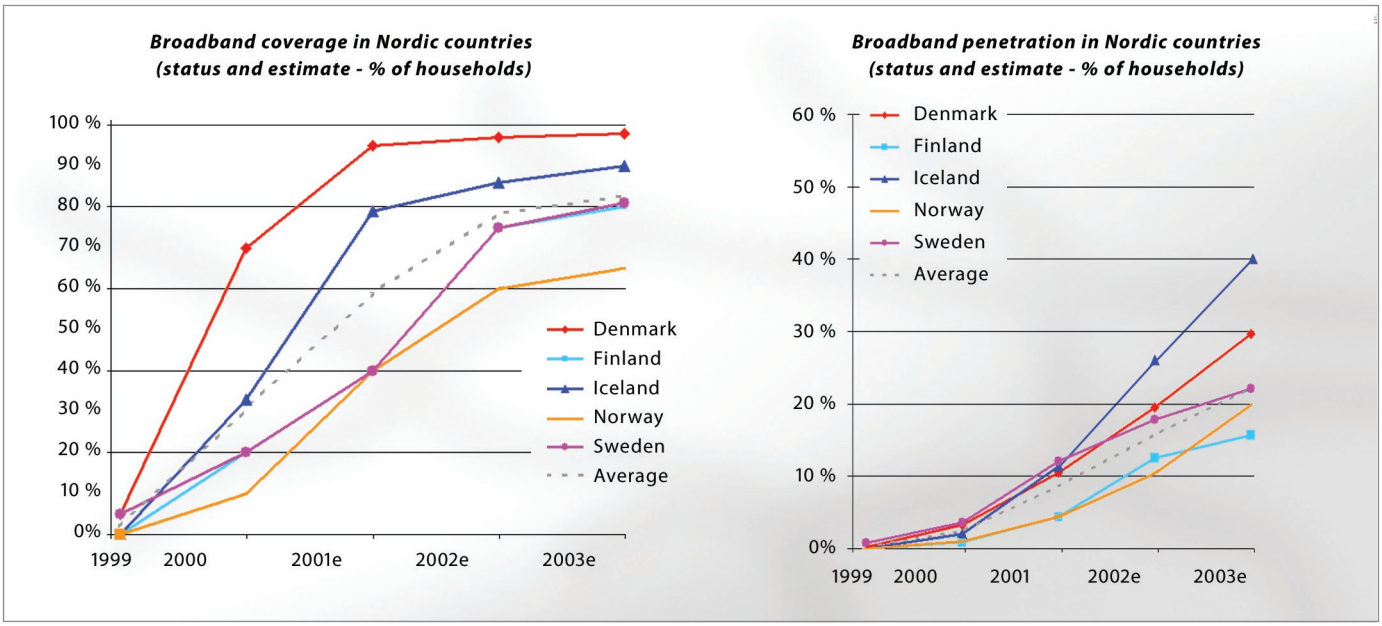

Figure 4 Growth in broadband coverage and penetrations in the private market (Norsk Telecom 2003)

In all the Nordic countries xDSL and cable have a strong market position. In Sweden, competition from the company Bredbåndsbolaget has meant that fibre optics have also achieved a sizeable market share (around 15 per cent). None of the markets has seen a particularly large rollout of wireless access, but Norway leads with a market share for wireless access of 1–2 per cent, due to the fact that Norway's topography is well suited to wireless access.

A forecast for the period up until 2008 produced by Forrester Research show that in Norway around 45 per cent of households will have a broadband connection by 2008. According to the prognosis, this will be the highest connection rate in Europe.

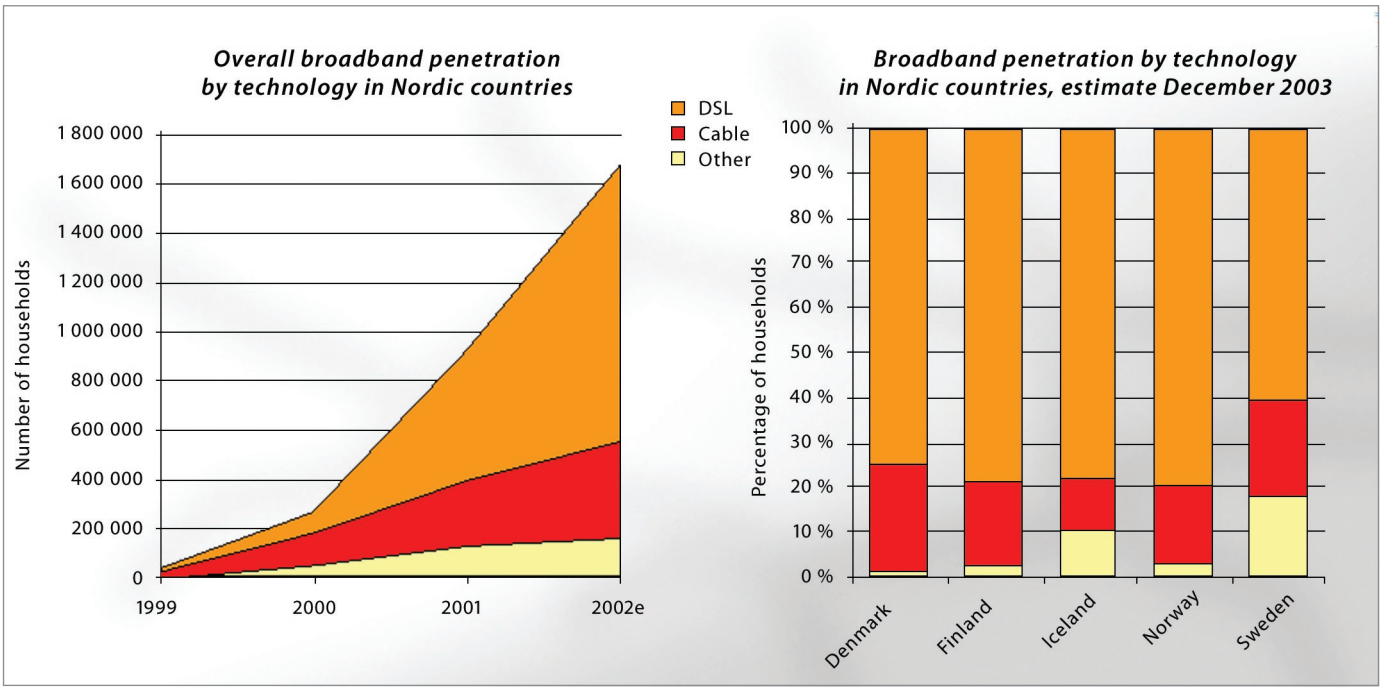

Figure 5 Penetrations distributed by different technologies in the private market in the Nordic countries (Norsk Telecom 2003)

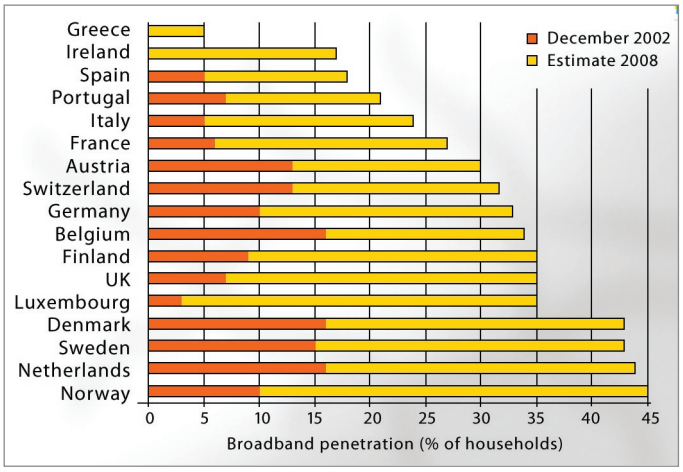

Figure 6 Actual and expected broadband penetrations in Europe, 2002 and 2008 (Forrester Research 2003)

3. Network, content and competence/skills should be seen in context

The rollout of broadband should be seen in the light of more conditions than network infrastructures such as the telecoms and broadcasting networks. On the one hand, huge investments are required to pave the way for the roll out of a *broadband infrastructure*, and the companies involved in this process wish to wait until demand is sufficiently high. On the other hand, it takes time to create *services* with *content*, and it takes time before users have understood the opportunities and defined their needs so that they demand new services. In addition, industry and the public sector must have sufficient *competence* regarding the opportunities and applications for investing in broadband solutions. It is important that the infrastructure should be seen in connection with the development of services, content and skills.

Communications networks must be designed so that they can both transport the services that are available today and be flexible enough to provide room for future services requiring greater transfer capacity. Broadband is supplied through a variety of competitive technologies, and new technologies are constantly being introduced at the same time as those that are currently available are being developed. It is important that the authorities pursue a policy that does not favour one technology over any other, and which paves the way for competition

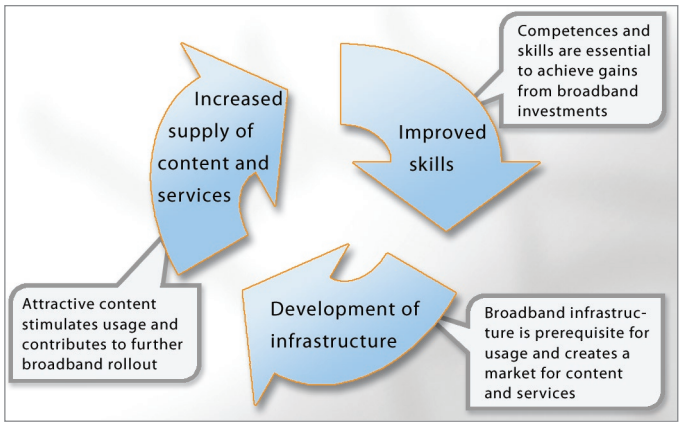

Figure 7 Network skills and content must be seen in context

between and within different technologies. The development of new technologies within the fields of, for example, radio and satellite may pave the way for offering broadband to a large part of Norway's population on a commercial basis. The rollout of broadband means that society's need for information technology will increase beyond current levels. Communication networks with a constant online presence also mean greater vulnerability. Security, planning, accessibility and a need for additional capacity (redundancy) need to be well planned. There are plans to develop different communications networks for a variety of purposes, including emergency communication. In connection with the development of public networks, the benefits of coordination should be realised.

The demand for broadband is to a large extent driven by growth in *services* and *content* requiring high transmission rates that are offered by the private market and the public sector. Developments are however not fully clear. Today we lack business models for the distribution of revenues between content and service providers and network operators. The value chains are complex and are being developed and changed in line with the introduction of new products on the market, and as technologies converge and branches of industry are restructured. Many business players have problems finding good business models. In the value chain for production and distribution of electronic content, there are also bottlenecks where monopolistic situations can arise. These include requirements concerning use of software from a dominant supplier, requirements to sell content through specific payment schemes or requirements that content and sources must be approved by specific controlling bodies.

The public sector has an important role to play in the development of services and content, both by offering services and by creating good framework conditions for the production of content. In many areas, the public sector administers basic data that is important for private enterprises wishing to develop services and content. It is important to ensure that these players will also have access to basic public data in the future, and that the organisation of central government does not have an inhibiting effect on the business activities of private enterprises.

Competence is an important prerequisite for realising the benefits of broadband. This applies to both user-skills and leading-edge expertise. Many people acquire IT skills at work. Those without access to the Internet at home or at work may encounter problems as an increasing number of essential tasks such as banking and postal services, information collection and the submission of tax returns are carried out electronically.

Schools and libraries play a key role in the task of strengthening the population's IT skills and in ensuring that pupils have the necessary background when it comes to acquiring new knowledge in new ways. It is a condition that new technology is seen in connection with organisational changes, new ways of working and skills networks. There is a need for skills with a focus on, among other things, organisation, technology and new business strategies. Norway has some of the most prominent environments in Europe in respect of e-learning. Broadband creates entirely new opportunities for interactive e-learning, which to a large degree can contribute to the development of the adult populations IT skills. Universities and university colleges will become central partners in respect of the development of leading-edge skills and applications. With the public sector as a demanding customer in terms of targeted training and education, Norway has an opportunity to create a strong and viable e-learning industry with an international potential.

4. Local initiatives are important for broadband rollout

In different parts of Norway, a wide variety of projects have been initiated in companies, local authorities and public bodies to speed up the rollout of broadband. Local initiatives of this nature help rollout and finance broadband, and provide increased competition in areas where telecoms companies do not initially find it profitable to rollout broadband. Financing will primarily be from local sources (local authorities, county municipalities, local businesses, organisations), alternatively with some external support for the financing of pilot projects.

In several instances, various public enterprises in one region, often in collaboration with local businesses, have joined forces to purchase broadband services at a regional level. This allows infrastructure costs to be shared and creates a larger customer base for inhabitants. Local authorities and county municipalities may also take the initiative to coordinate and plan infrastructure in the municipality or region and manage broadband roll-out by stipulating where ditches are to be dug and cables are to be laid. Local authorities and county municipalities may either involve themselves directly in the supply of services, or they may leave this to commercial players in the market.

The Norwegian Government is positive to these local initiatives, provided that the rollout of broadband is organised so that it has as little adverse effect as possible on market competition.

In southern Norway, a collaborative project called "Digital Regional Agder" (see box) has been established between local authorities and county municipalities. The local authorities that have been involved in the project have received a better offer as regards coverage and capacity/transfer rates than if they would if they had purchased broadband individually. For many municipalities, cooperation has been essential in order to establish an offer of broadband.

Digital Regional Agder

In the county municipalities of Aust- and Vest-Agder, 18 outlying municipalities in three inland regions established the cooperative project "Digital Regional Agder" (DRA). These municipalities represent just under 60 000 inhabitants, where the smallest municipality has under 900 inhabitants and the largest over 13 000. The objectives of DRA are: 1) that the regions shall have a competitive offer of broadband on competitive terms, and 2) that the municipalities shall use broadband to enhance the efficiency and quality of their own organisation and range of services.

The DRA project has by means of invitations to tender and negotiations put in place an agreement for the supply of broadband to all 18 municipalities at competitive prices. Under the terms of the agreement, all local government administrations will be supplied with 24 Mb capacity in fibre cable, with the opportunity of additional connections to other public buildings, private industry and to households. Under the agreement, the three regions, consisting of three, five and five municipalities, respectively, will each have their own shared connection point to the Internet, which will increase capacity and reduce costs. As a result of the broadband agreement, 12 upper secondary schools in Aust-Agder will have a connection with a capacity of 10 Mb at competitive prices. All schools will be connected by means of a new fibre cable. Once the broadband connection is in place at the end of September 2003, the stage will be set for continued development and the enhanced efficiency of municipal and inter-municipal cooperation.

The DRA project can be characterised by shared funding by central government, county municipalities and municipalities, which has been the key to realising the project which is budgeted to cost NOK 27 million; the combined purchasing power of 18 municipalities has yielded interesting results compared to what they would have achieved had they each stood alone; the project has been rooted at the level of mayor/chief financial municipal executive in all 18 municipalities; the project has been based at all times on the principles of equality and solidarity between the municipalities – each municipality pays the same and receives the same capacity, regardless of numbers of inhabitants and geographical location; there has been a large degree of codetermination from all municipalities in budget and activity processes; the county municipalities have played an active role in initiating the project and in acting as a driving force.

Digital Regional Agder 2003

5. The authorities will encourage continued development

It is the responsibility of businesses to upgrade their skills and pave the way so that they can use the technology effectively and reap the greatest benefits possible from their use of broadband. Continuous training, new opportunities and enhanced efficiency are also important for other parts of the private sector.

Like most other OECD countries, Norway has chosen a market-based strategy for the rollout of broadband, in line with OECD recommendations. The market players stand for development of the infrastructure for electronic communication and appurtenant services, and for the choice of technology. The Government will pursue a *neutral policy as regards technology* in order to secure competition within and between different technological platforms. Central government has no capability to choose between technologies, and shall not therefore do so. The Government's strategy for broadband rollout is to:

- *Pave the way for effective competition* in the rollout of the communications network and development of services and content.
- *Stimulate public demand for broadband* and pave the way for the development of services and content, skills development and the dissemination of experiences.
- *Consider special measures in areas where there is no commercial basis* for broadband rollout.

One central initiative for strengthening competition in the telecoms market is the new Act on Electronic Communication, which replaces the previous Telecoms Act. The new Act provides the authorities with instruments with which to strengthen competition in the market. At the same time the Act contains instruments that are flexible enough to both stimulate and regulate the emergence of new markets. The new Act continues the principle of a sector-specific regulation, but it also paves the way for a gradual transition to regulate the sector with a basis in general competition law. Other initiatives are to pave the way for improved use of current and new telecom networks, publication of reports concerning matters relating to price and competition and to make available radio frequencies for the production of radio-based communications networks for use by market players.

The public sector is responsible for comprehensive service production and many supportive activities such as administration of basic data and information in respect of the general public. It is the Government's wish that the total thrust of public demand shall be utilised more systematically in order to enhance efficiency in the public administration, i.a. through applications that require broadband. Such applications improve the quality of services and provide room for enhanced efficiency and cooperation. The health and education sectors are two of the most important sectors in this respect.

The Government also paves the way for improving conditions for private development of content and services based on basic data owned by the public authorities. One example of basic material with a large potential for cooperation between public and private enterprises is geographical data in the form of electronic maps. The purpose of providing tax exemptions for home PCs is to increase general IT skills. This exemption also extends to broadband connections.

The Government will strengthen its efforts in respect of providing guidance by stepping up and improving the coordination of support services. The Government will pave the way to enable the support service apparatus to assist in processes whose aim is to gather local demand for broadband communication.

The HØYKOM programme, which enters the last year of its second three-year period in 2004, has so far had a major triggering effect. The overall objective of the HØYKOM programme is to stimulate the dissemination of broadband communication in Norway, especially in remote areas. The programme runs for a six-year period, starting in 1999 and ending in 2004. At the end of the ordinary programme in 2004, a total of 400–500 projects will have received support at a total cost of around NOK 250 million, which in turn has triggered investments

totalling almost NOK 1 billion. The programme has good geographical distribution and has been the source of extensive cooperation in the public and private sectors. The programme is due to be evaluated in the autumn of 2003.

Effective from 2002, a schools programme was established (HØYKOM School) to investigate future needs and specifications for broadband in the education sector, to provide initiatives to stimulate infrastructure and the development of content and services. A preliminary evaluation of the HØYKOM School programme has shown that this scheme has been in demand by school owners. The Government will therefore propose that the Høykom School programme should be continued in 2004.

The broadband market is still in an early phase. One challenge is to trigger investments in sparsely populated areas of Norway. In the Norwegian State Budget for 2004, it will be proposed that the programme be expanded by introducing, a new programme, HØYKOM Region, aimed at rolling out broadband in sparsely populated areas.