HØYKOM

The **Research Council** of Norway

Norwegian and Swedish broadband initiatives (1999 - 2005)

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Foreword

Norway and Sweden both initiated significant broadband initiatives in the late 1990's. The two neighbour countries have many similarities, but they approached this task differently. An important characteristic of the Swedish initiative is its emphasis on infrastructure and network planning. In contrast to this, the Norwegian initiative focused dissemination of broadband applications and an intention not to intervene with infrastructure rollout if market cold be expected to do the job.

Høykom has been working on two fronts: One is financial support to broadband demanding e-services on an application basis. The second is documenting and disseminating broadband related knowledge and experience. The Høykom report series is established to underpin the latter.

Kjell Hansteen knows the Norwegian initiative, Høykom, from first hand experience. He has been working in the program secretariat first at its start up in 1999 and than again for the last couples of years. He has a background form telecommunication and computer industry, and has collaborated on several Høykom reports.

This paper was written for International Telecommunications Society's (ITS) conference on regional development in Pontevedra, Spain 20–22 July 2005. It was presented by Kjell Hansteen at the conference.

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Contents

1 Background

1.1 Norway and Sweden

Norway and Sweden are two sparsely populated countries at the brim of Europe. Norway has a population of 4.6 million people, Sweden has 9.0 million.

The map reveals that the northern part of Sweden is dominated by rural/remote areas with less than five inhabitants per km^2. In some areas the population density is less than one person per km^2.

Northern Norway shows similar patterns, particularly in the two northmost counties.

Population density – Nordic countries (Source: Nordregio)
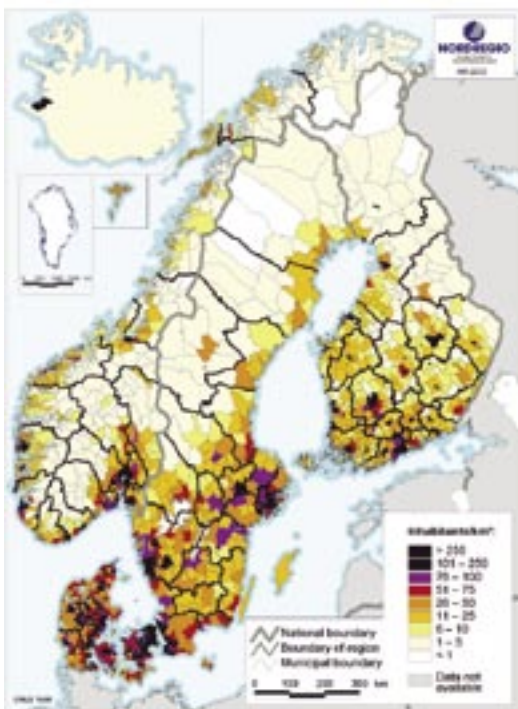

Three levels of government

Both countries have three elected levels of government with their own powers and responsibilities: Norway has 19 county administrations at regional level and 433 municipalities at local level. Sweden has 21 county administrations at regional level and 290 municipalities at local level.

Municipalities on local and regional level are governed by elected assemblies known as municipal councils or county councils. Both countries have state representatives functioning as the Government's extended arm at county level.

Sweden has been a member of the European Union (EU) since 1995. Norway is not a member, but through its membership in the EEA[1], Norwegian businesses are entitled the same treatment as companies of EU states.

Both countries have a standard of living above the European average and both are early adaptors of ICT[2]-related technology e.g. mobile telephones.

Population densities in some selected OECD countries

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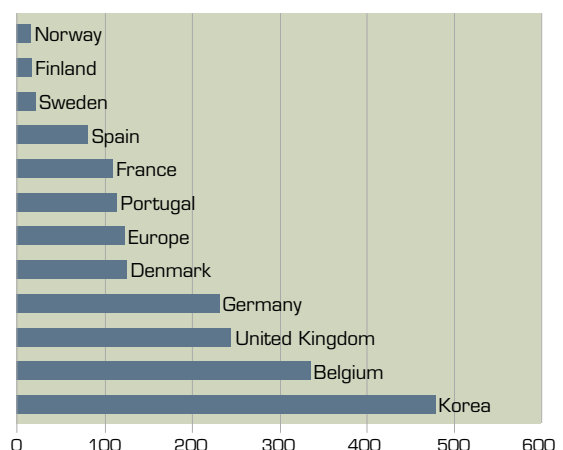
[1] EEA – European Economic Area Agreement

[2] Information and communication technology

Norway and Sweden both launched broadband initiatives in the late 1990s

In the late 1990s both countries experienced strong public interest in the promotion of broadband and the Internet. Information technology was regarded essential for business competitiveness and a high standard of living. Business, but also public administration and citizens in general would need high speed communication in order to develop and prosper.

Broadband was regarded particularly important for rural and remote areas. In 1999 the Norwegian Minister of Local Government and Regional Development, Odd Roger Enoksen, expressed an aspiration to provide fiber connections to all households and enterprises in the country. His ambition was never put into operation, but the viewpoint illustrates well the importance allocated to broadband in Norway at the time.

In 1998 the Swedish Government appointed an IT Infrastructure Commission to investigate the need for information and communication infrastructure. A primary task was the investigation of broadband accessibility in a regional and social perspective. In addition, technical development trends and needs were to be analyzed. The Commission published its analysis and recommendations in a report entitled "Broadband for nationwide growth"[3]. The report forwards a number of specific policies on an IT infrastructure level, as did another report from the same period – SOU 1999:134 – A Future Proof IT Infrastructure[4]

1.2 The Swedish approach

A Swedish IT-infrastructure programme with a budget of 588 million € (5,8 billion SEK) was initiated in August 2001. Its ambition for a better ICT infrastructure on all levels rested on three pillars:
• A new and alternative nation trunk network covering all parts of the country in open (non-discrimination) manner

The Swedish approach
• Financial support to local and rural communication infrastructure.
• Ambition to create an alternative open backbone network connecting all municipalities.
• Financial support conditioned by local municipal planning
• Tax reductions to residents and companies when connecting to broadband networks.

• Economic support to municipalities, business and households stimulating their adoption of this new technology
• Measures to counteract the development of local monopolies

In addition to these measures the initiative focused measures to increase the public "trust in ICT" and the elevation of ICT competence on a general basis. However, a key characteristic of the Swedish approach has been its emphasis on network planning and physical infrastructure.

Economic support to local broadband infrastructure is conditioned by two criteria:

1. The municipality must develop and present for approval a local IT-infrastructure plan
2. The local municipality must participate in the financing of the infrastructure (Initially set to 30 percent, later reduced to 5 percent)

The plan should cover a 5 year perspective and address a number of specific topics (Se text box). Financial support is conditioned by an approval of the "broadband plan" by the regional municipal authority.

The plan must comprise a chapter on how local monopolization will be avoided and how network capacity will be made available in a non-discriminating manner.

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[3] SOU 1999:85 Bredband för tillväxt för hela landet
[4] SOU 1999:134 Framtidssäker IT-infrastruktur för Sverige

The approach where local municipalities have been forced to develop a broadband plan, has stimulated the development of ICT competence on local level, but there has been a price to pay. The massive and formal planning work implied a long start up period.

1.3 The Norwegian approach

In May 1998 the Norwegian Government issued a report to the parliament stating what have since been key principles in Norwegian broadband policy (St.meld.nr.38 (1997–1998)).
• Ensuring every household and business throughout the country basic telecom services of high quality at the lowest price possible. The rules of a (newly) deregulated telecom market were to support this.
• The establishment of a programme (Høykom) to motivate public agencies to use broadband applications and services. The programme was to have a special focus on remote area challenges.

The Høykom programme was initiated in 1999, initially for a period of three years (1999–2001). Based on good results, the programme has since been prolonged two times. The current period of operation ends in 2007.

The aim of the Høykom programme is twofold; To improve public sector performance and IT competence, and at the same time stimulate broadband offering in rural areas as well as more generally. Public-sector organisations that wish to use broadband in its own administration, or establish broadband based public services, may apply for financial support on a project basis. Høykom may in this way provide financial support in the initial years of a broadband application, thus making it possible for a public organisation to cover relatively high initial broadband costs. However, on a more permanent basis, price reductions or benefits from new and more efficient work processes enabled by ICT should allow for permanent usage.

Project candidates are evaluated by a programme board supported with expert evaluations. Public organisations on any level or sector may apply for funding. Typical application areas are e-services, included digital maps; telemedicine applications; videoconferencing solutions; interactive e-learning resources and inter municipal ICT operation centers.

Over the years Høykom has co-funded more than 400 projects. Programme funding is limited to maximum 50 percent of total the project

cost. So far, Høykom has allocated € 50 million (NOK 400 million) to at total project volume of approximately €130 million, E.g. the Høykom support is on an average around 35 percent of total project cost. The intention to use central money as a trigger seems well fulfilled.

Another important characteristic of the Høykom program is its extensive contact with public projects and public administration. Over the years Høykom has received more than 1000 project applications. This has contributed to give the programme a high visibility in rural municipal Norway.

Broadband to schools gave positive side effects

The Høykom budget is currently provided by the Ministry of Modernisation, while the initial three year period was funded by the Ministry of Trade and Industry. The Ministry of Education and Research has financed a three year scheme dedicated to the education segment within the scope of the Høykom program. This scheme – "Høykom Skole"– differed from the initial Høykom, as it opened for financial support to infrastructure projects in addition to the established Høykom operation modus.

Over a period of three years, one tenth of all Norwegian primary and secondary schools were upgraded to high speed connections through this programme. An independent evaluation of Høykom in 2003[5] gave particular attention to "Høykom Skole". This because upgrading schools with high speed connections implied bringing fiber based backbone network to nearby telecom distribution centers. As schools are located where people agglomerate, this facilitates deployment to residents and local business in the same area.

The evaluation team further declared that Høykom as a programme had performed well on the municipal level, but was more reluctant to its influence on a national level. The influence on general demand, on national level, was found not to be very large. The evaluators anticipate that stronger measures of accumulation would be necessary in order to obtain this.

Year	Høykom	«Høykom School»	«Total (mill NOK)»	«Total (mill euro)»
1999	12,0		12,0	1,5
2000	18,0		18,0	2,3
2001	38,5		38,5	4,8
2002	53,5	48,0	101,5	12,7
2003	51,5	23,0	74,5	9,3
2004	66,5	16,0	82,5	10,3
2005	50,0	0,0	50,0	6,3
	290,0	87,0	377,0	47,1

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[5] Finne, Håkon, Anders Ekeland og Yngve Seierstad Stokke (2004): Bredt bånd i tynn tråd? Evaluering av HØYKOM.

2 What happened?

2.1 Physical network level

This paper uses a three layer analytical model to illustrate some important aspects of broadband communication. The lowest "Physical level", includes right of way, ditches, and physical infrastructure e.g. fiber optic cables and radio antennas. The access network connecting business and residential subscribers are included in the "physical level".

The intermediate level, the "logical level", is the level of interconnection. This is where connections are set up and where separate networks are interconnected to another. This is a level of many alternative technologies, communications protocols and standards. This level is the kingpin to interconnectivity.

Open and operator neutral network modell
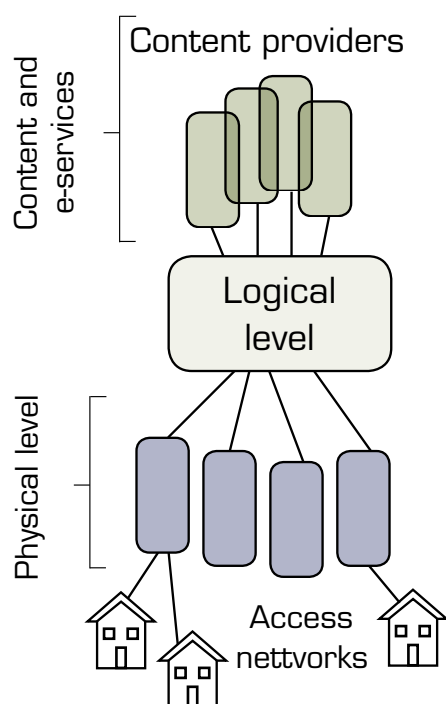
Local white spots are vanishing in both countries

One year ago, in the spring of 2004, about 70 percent of Norwegian households were reported to have a broadband offering[6]. On a national level this was promising, but distribution across the country was uneven. There existed many geographical "white spots", and there was a certain pessimism as to whether these spots would ever disappear.

One year later there are few white spots on the Norwegian broadband coverage map. Only two municipalities will be completely without commercial broadband offering summer 2005. More than 90 % of all Norwegian households are expected to have a broadband offing by the end of the year[7].

Vertically integrated operators encompass all communication leves
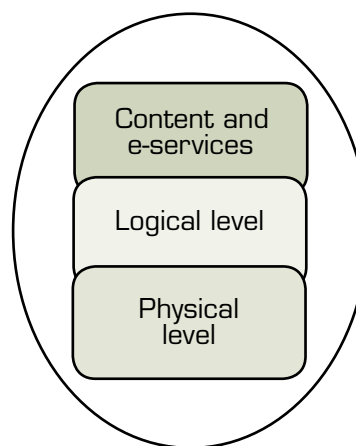
In October 2003 only 62 of 270 remote municipalities enclosed in the Swedish scheme were reported to have established a local municipal network. Since then the speed of deployment

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[6] Hansteen, Kjell and Kjell Arne Nielsen (2004): Regional bredbåndskoordinering, Oslo: Høykom report 405

[7] Teleplan (2005): Bredbånd – dekning og tilknytning.

[8] Björn Björk, Sveriges Kommuner och Landsting

Norwegian "white spots"
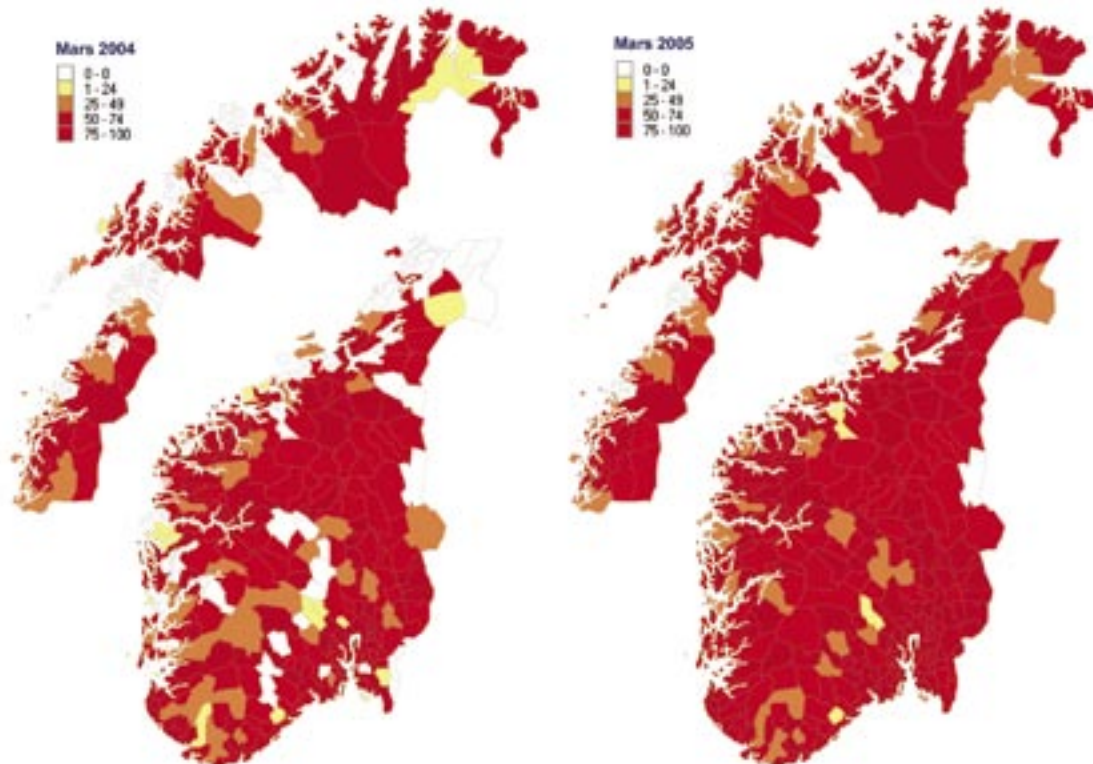
has increased much. The Swedish approach with its focus on up front planning was late to take off, but is now catching up with Norway.

The current situation in Sweden is very optimistic as reported by spring 2005[8]. With very few exceptions all municipalities have their local broadband plans ready and approved. In 55 percent of the cases independent municipal networks are already established. By 2006 almost every (99 percent) of remote agglomerations with more than 200 inhabitants and 75 percent of those with 50 to 199 inhabitants will have a local broadband network established. In three of four cases the central financial support is already released.

Several parallel backbone networks in both countries

Following the deregulation of telecom markets in Norway and Sweden in the 1990s, policy in both countries were to let market forces – as far as possible – resolve the demand for broadband communication. However, the Swedish initiative differed from the Norwegian in that it also focused explicitly on networking structure. The state was to survey the existence of competition and plurality at all network levels. The Sweeds also stated a clear ambition to establish an open alternative communication backbone based on fiber optic technology, covering every municipality in the country.

The Swedish broadband initiative initially planned to assign this task to a company dedicated for the purpose, Swenet AB. As a second best choice, the task was assigned to Svenska Kraftnät. In august 2000 the Swedish Government assigned to Affärsverket Svenska Kraftnät the mission to provide high capacity connectivity to municipal centers in all Swedish municipalities. Svenska Kraftnät was state controlled and owner of the electric power distribution networks on national level. The task was to be completed by the year end 2002.

Independent of the two nation's different approach, the national backbone situation looks much the same today in the two countries. In Sweden the initiative to provide an open national backbone has developed into an ordinary backbone along others. The initial ambition to build a open alternative backbone has been much moderated. The connection of "all municipal centers" has been change to "nearest agglomeration within the municipality", and the time period for the realization of the backbone has been much extended.

Today's situation in Sweden is, as in Norway, several competing commercial backbone operators. Operators offer connectivity in one meaning or other depending on their business strategy. No well defined openness seems to exist on national backbone level in either country.

The main Swedish backbone operators are; Telia, Banverket and Svenska Kraftnät. The first is the originally Swedish state owned telecom operator, Banverket has as it origin the communication and signaling for Swedish railway. In addition to the tree mentioned above, the company Utfors has built its own national backbone.

Norway has three relatively complete backbones on national level. Telenor, the former state owned telecom monopolist has a toll network with complete geographical coverage. Connection is available in a number of service levels on a non-discrimination basis. However, Telenor is a vertically integrated operator and as such has an interest in setting prices that protect own business, e.g. content and high level services.

BaneTele owns and operates a redundant fibre-optical network with good national coverage. The main backbone follows railway lines and high-voltage power lines. The third is Bredbånd-salliansen[9] made up of six regional companies with ancestry in the energy sector.

2.2 Logical network level
Many small independent operators in both countries

Norway and Sweden both experience a high number of independent broadband providers. In Norway alone there exist more than 130 with a wide-ranging level of services. Sweden reports a similar number. By the year end of 2004 two or more operators offered services in 85 percent of Sweden's municipalities. In many cases four or more operators would be present (30 percent).

In Norway many operators are offspring of local hydroelectric power station companies. Such companies are often owned or controlled by local municipalities. They have cabling skills, a local customer base and most of them, a sound financial position. This has provided for a quick start with local municipal backing. More than 50 municipalities and equally many local hydro power electricity companies are engaged as owners.

Residential and business end users of 2005 demand high-value services. The days of Internet connectivity delivered as an best effort service will soon be gone. Subscribers demand IP-telephony and video on demand in addition to Internet. The new services demand a different level of service quality that represent a challenge to all these small companies.

In Sweden the association of network owners, SSNf – Svenska Stadsnätsföreningen plays an important role in the professionalization of the small and independent broadband operators. SSNf serves as an advisory body on legislation and standardization questions as well as technology and market development. The organisation runs projects developing and documenting best practice on issues as network security, quality of operation, interoperability among networks etc.

Norway has no parallel organization and it is an open question whether Norwegian municipali-

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[9] BKK, Lyse Energi, Agder Energi, Eidsiva Energi, Nord-Trøndelag Energiverk (NTE) og Troms Kraft.

ties understand the business many have engaged in. Running a broadband communication operation involves economic risk, market positioning, customer handling, billing of subscribers, and not least, continuous investments. A single fibre as such may last for 20–30 years, but keeping it operational as a communication channel demands continuous upgrading of equipment, and investment in people and competence.

Local level openness or local monopoly?

A central constituent in Swedish broadband policy is the phenomena "stadsnätt". The word corresponds to "urban area network". The most widely renowned and in many ways a model for the others, is the network built and administrated by the city of Stockholm and run by the company Stokab.

Stockholm has been fibred under municipal regulation. This has limited the parallel ditch digging that many other large cities have experienced. Municipal service providers may rent dark fibre of Stokab at cost price and equip

it with transmission equipment according to own specifications. Stokab has over the years kept strictly to dark fibre as it communication product – this in order never to compete with its own customers, the public service providers in Stockholm.

Event though a recent evaluation of Swedish IT policy (ITPS 2003) expresses a regret that few Swedish municipalities have chosen this model, the Stokab operation is important in that it demonstrates a clean cut business interface that may be used to underpin openness in a network.

In Norway there has until recently, been few discussions of pro and cons of local monopoly and network openness. Neither has there been a dark fibre market of any significance in Norway. Local broadband operators have in many cases developed local monopolies with the full acceptance of local municipal authorities. There has been little awareness on the disadvantages that often follows the establishment of local vertical integrated operators. This differs from Swe-

Full online availability
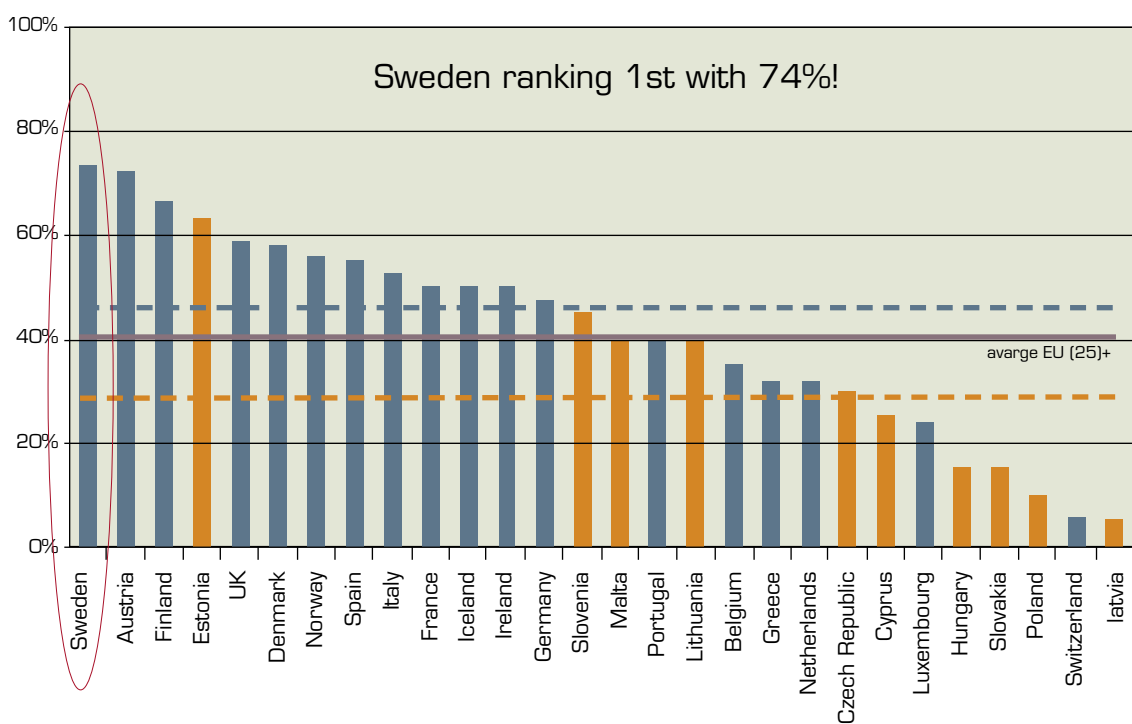
e-service on line availability. (Cap Gemini)

den where broadband plans require municipal authorities to state explicitly a position towards openness and a not monopolized situation on local level.

2.3 Content and e-service level
**Norway and Sweden
rate high on e-services**

Sweden and Norway are both ranked high on a recent study on online availability of public services[10]. The report presented benchmarking results of sophistication as well as online availability of online public services. Twenty basic public services were rated. The study included both citizen oriented services e.g. car registration and birth certificates, as well as business targeted services, e.g. VAT registration.

Sweden got top score and Norway was ranked number six in a ranking of "sophistication of public services". Sweden was ranked best in a ranking of "on line availability" with Norway number seven.

Citizens' gateways under development in both countries

The general public experience is that many services are available electronically, but as a user you have to understand and adapt to a number of different solutions and interfaces. In general public agencies have established e-service solutions reflecting characteristics of their own IT systems and own organization.

The Norwegian government recently presented an overall plan for its e-government activities[11]. It expresses a dedicated ambition to coordinate service provision and open solutions. By 2009 all interactive services aimed at the general public will be made available at a personalized citizen portal, "MyPage". This is a "one stop gateway" for public e-services independent of service

provider[12]. Services provided by the local community will be presented alongside services from regional or national service providers.

Standards for interchange of data and documents between public services are to be defined by the end of next year. Public agencies are to develop plans to document own use of open standards, architecture and code. By the end of 2008 all exchange of data and documents are expected to comply with these directives. There is also an ongoing effort to establish interoperability between the three different systems of digital signature present in Norway – this to facilitate the use of digital signatures across sectors and services. The aim is a coordinated and user-adapted public sector interface.

In Sweden the portal Sverige.se bears many similarities to Norge.no. However it seems less intended as a single service point and more as a traditional orientation portal. It provides links and contacts for Swedish parliament, government, county councils, municipalities and authorities, social insurance offices and universities.

Difficult to seize the potential benefits

In principle the introduction of e-services is as beneficial for back office operation as for the citizen. A construction application handed in using an online application may be checked and validated for formal errors and missing information by the system. This saves time and money not only for the citizen, but also for the public sector servant.

Four municipal administrations around the town Stavanger in Norway, have established an Internet portal that present their residents with one universal office front on the net. It allows – in theory – the back office resources of all four

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[10] Prepared for European Commission, Directorate General for Information by Cap Gemini

[11] Moderniseringsdepartementet (2005): eNorge 2009 – det digitale spranget

[12] http://www.norge.no

municipalities to operate as one pool. Municipal personnel may supply and replace each other. With broadband interconnection, equipment from the four municipalities may operate as one common pool of equipment.

Many Høykom projects bear similarities to this example as they state an ambition or a potential for saved cost and higher back office efficiency. However, the experience is also that the potential benefits are seldom fully exploited.

As a response to this, Høykom is currently dedicating resources to the development of tools and modes of operations that can ensure the realization of potential project benefits. The Ministry of Modernization has recently commissioned a special report on this theme – *Project benefits & results. Indicators for use in the Høykom programme* [13]. The report describes quantitative and qualitative indicators that forthcoming Høykom projects will have to report. The aim is to identify and combat legal, organizational and technical obstacles that prevent the reaping the full potential of broadband technology investments.

[13] Lanestedt, G. and Thor Mogen (2005)

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The Norwegian Government has expressed a clear intention to promote the development of a coordinated and user-adapted public sector. The Government has two overall goals in its modernisation process: Making the general public's interaction with the authorities easier and freeing resources which may strengthen the welfare state. In the Government's efforts to reach these goals the Høykom programme plays an important role supporting public sector organisations that wishes to utilize broadband intensive eGovernment services within the scope of a time limited project.

The Norwegian Høykom programme is at present in its third period of operation. The programme was initiated in 1999, initially for a period of three years (1999–2001). Its third and current period of operation runs from 2005–2007. Høykom is expected to be continued as a programme on its current level, and measures will be taken to transfer best practice experience established in Høykom projects into public e-services and governmental practice on a broader level. Measures will also be taken to disseminate the large quantity of knowledge and insight into eGovernment related issues that has been built up in the programme during its time of operation.

The Høykom programme is explicitly mentioned in the newly released "eNorway 2009 – the Digital Leap". The programme has an important place in this action plan, as a provider of examples of successful eGovernment implementations and project candidates for extensive roll out, and as an instrument financing and coordinating eGovernment initiatives.

Høykom works extensively to promote knowledge diffusion from individual projects as well as on program level. This is done thorough dedicated publications, beacon project initiatives and as a network arena for Norwegian broadband activities of may kinds. Høykom holds a central position in the public sector innovation system in Norway.

Organisation

HØYKOM is currently financed by he Ministry of Modernisation, and the Ministry of Education and Research. The programme is administered by the Research Council of Norway.

3.1 Høykom Lighthouse Projects

In 2004 Høykom identified certain projects to be showcased. They were designated as Høykom Lighthouse Projects. The headlines of the Lighthouse Projects were:

• X-ray expertise available via broadband
• Norwegian film legacy available any time any place
• Municipal e-services – Smartkom
• Electronic maps: Layer upon layer
• Fibre optics for a whole municipality (Sandefjord)
• University colleges also in small municipalities
• Patient in Alta – Physician in Tromsø
• Multimedia tools for pupils
• Digital signatures
• Educational toolbox

The experience using selected Høykom project as "Lighthouse projects" to promote the programme and attract general public interests to broadband issues has been a success. The approach will be continued in 2005/2006 with the selection of seven new projects. The projects will be within the following topics areas.
• Digital roentgen
• Digital maps
• Public e-services
• Teaching
• Municipal cooperation
• Film distribution to schools and homes

For further information on the new Lighthouse projects write to *hoykom@forskningsradet.no* or have a look at *www.hoykom.no*

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