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FISHING FOR FUN AND PROFIT?
Norway domesticates multimedia

STS-arbeidsnotat 2/97

ISSN 0802-3573-138

arbeidsnotat
working paper

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1. A rapid appropriation

When one of the authors was teaching an introductory course in computer science to students coming right out of secondary school in 1994, it proved that only a few of them knew about World Wide Web and the Internet. None of them had tried surfing on the net. In 1997 these concepts are so familiar to all new students that we hardly need mention them at all. Apparently, the web has become an integral part of the life of most Norwegians almost overnight.

Statistics seem to confirm this impression. In November 1996, a total of 114,900 private user connections had been sold by various access providers, see the break-down in table 1.1. A Gallup survey at about the same time showed that over half a million Norwegians (about 11 per cent of the population) would access the net at least once a month. Furthermore, 160,000 persons would be logging on daily, as opposed to 63,000 persons one year earlier. The reason why more users would be on the net regularly than those with a household connection is that many users do their browsing at work.

Table 1.1. Access providers November 1996.¹

Name of access provider	Number of private users	Number of nodes	Number of modems
Telenor Online	50,000	70	3,312
Schibsted Nett	40,000	77	1,840
RiksNett	11,000*	74	900
EUnet	5,000	36	436
Powertech	4,500	12	
Internet Norge	1,600	11	
IDG New Media	1,500		
Tele 3	1,300	8	

* June 1996

¹ Frode Eriksen: "Krigen avlyst?", *Internett Kanall digi*, 11.11.1996, <http://www.sol.no/kanall/digitele/fe11288745.htm>

In addition, Gallup surveys have documented that the household market is growing rapidly, see table 1.2. The potential for future growth is seen as promising because there is already a PC in 46 per cent of the Norwegian households, most of them yet without an Internet connection.²

Table 1.2. Persons with household Internet access.³

Time of Gallup survey	Number of persons	Per cent of population
January 1996	120.000	3.3
October 1996	214.000	5.9
January 1997 (estimated)	300.000	8.3

Thus, in many ways, the Norwegian appropriation of the Internet and multimedia technology reads like a rapid success story. *Business Week* has described the Scandinavian countries as being leading in the field in Europe, neck-to-neck with the US. They even suggest that the business prospects in the near future, relatively speaking, are more promising in Norway than in the US.⁴ While such speculations should not be taken too seriously, we nevertheless face the challenge of accounting for the situation of rapid change. What has happened and why?

We will try to answer these and similar questions that the development of the multimedia field poses. The Internet is a central element, and many of the efforts by major actors are linked to its development. Efforts to provide Internet access as well as applications reflect many kinds of strategies and the establishment of more or less stable relationships between actors. Also, local actors sometimes seem to be overrun by multinational concerns, and many mergers seem to disadvantage small actors. Above all, the field is in a state of flux where changes may come quickly and in surprising ways.

This paper will present an account of how multimedia has been appropriated in Norway. Our story is mainly concerned with the way this new technology is transformed into social practice. What is interesting about the Norwegian situation is not technological development in a narrow sense, since most of the technology in question is imported. What happens in Norway (and in most other countries as well) is the discovery of how multimedia may be put into use, and how this process of discovery is related to a configuration and reconfiguration of social actors, their relationships, and their institutional embeddedness.

² "PC i halvparten av norske hjem", *Schibsted Nett Direkte*, 18.12.1996, <http://www.sn.no/snpub/SNDirekte/index.cgi?art=1100441&kategori=Nett%2dNytt>

³ Olav Anders Øvrebø: "Internett – tilgang og bruk", *Nettavisen*, 1.11.1996, <http://www.nettavisen.no>

⁴ *Business Week*, August 26, 1996, p. 18-19

Above all, our analysis is an empirical exercise in how to map recent developments in Norway. However, we will also explore some possibilities to account for these developments in terms of national context as well as strategies of relevant actors. To what extent is the emerging multimedia scene the outcome of various "fishing trips" of interested actors seeking fun and/or profit? Or can we observe the realisation of conscious strategies of public and/or private actors?

Initially, we will take a brief look at how we may conceptualise the process.

2. Domesticating a new technology: Building institutions, learning strategies

In the last 20-25 years, a lot of efforts has been put into the formulation of information technology policies. Repeatedly, we have met the warning that the "Information society" is coming: Beware or meet the consequences! The content of the slogan has never been very clear, and it has been transformed several times. The concern has shifted from automation of work and unemployment to communication and play. The development of the field of multimedia is both an outgrowth and a potential transcendence of concerns of previous decades.⁵

The policies that have been formulated, with a few exceptions, see the government as an important instigator. In some countries, the development of information technology (including multimedia) is an object of social planning. However, in the current liberalist climate, it is more common to argue that the role of the government is to support the necessary initiatives from private industry. It is the private sector that should be able to shape the new technology. Since the field of telecommunications in most countries is strictly regulated, it is strongly advised to deregulate this sector as much as possible, and as soon as possible.

Still, even in strongly liberalist countries, governments do have technology policies that will also effect multimedia. Above all, we can observe supply side policies concerned with supporting the development of new technologies and their transformation into economically successful innovations. In addition, maybe less focused, most governments are engaged in what may be described as demand-oriented policies that help structure the social environment of multimedia. At the very least, this will be the outcome of policies related to education, implementation of multimedia in government agencies, changes in the structure of public services, etc. But how may we understand the unfolding logic of the situation?

⁵ See for instance Sherry Turkle: *Life on the Screen: Identity in the Age of the Internet*. New York: Simon & Schuster, 1995; Joan Greenbaum: *Window on the Workplace: Computers, Jobs, and the Organization at Office Work in the Late Twentieth Century*, New York: Monthly Review Press, 1995.

The uptake of a new technology has traditionally been described as a process of diffusion, following a kind of S-curve distribution of time. According to such analysis, we may observe a period of introduction with slow growth, where users are pioneers, followed by a period of relatively fast expansion to end by a levelling-off period where diffusion moves slowly again. The actual percentage of the population that buys the artifact varies a lot and its prediction has proven to be difficult.⁶

However, the introduction and uptake of a new technology is much more than just a question of market penetration. In general terms, what is taking place is a process where the technology and the social system under scrutiny co-evolves in a process of reciprocal shaping. If domestication is successful, the artifact becomes situated, practically and symbolically, while the social system develops routines and institutions to support and regulate it. Users will construct practices as well as meanings around the artifact which will be transformed from an alien into a recognisable element. This process may be called *domestication*.

Domestication may be analysed at least at two levels. Previously, the phenomenon has been studied at the level of the household or the individual.⁷ Here, it may be observed that it involves practical, symbolic, and cognitive aspects.⁸ However, domestication also has to be performed at the level of the nation state which involves issues like infrastructure, institution building, and regulation.⁹

The case of multimedia penetration in Norway represents an interesting opportunity to study domestication at the national level and to develop concepts needed to analyse and to understand the process of domestication. This paper is meant as an effort to do so. Obviously an analysis such as this one meets with several important problems.

First and foremost, there is the issue of structure versus agency, of system versus action. In principle, one could expect that it would be possible to give a contextual account of multimedia in Norway that tried to explain the development with reference to particular features of Norwegian society. On the other hand, the catalytic properties of new technologies may prove to make

⁶ Everett M. Rogers: *Diffusion of Innovations*. 3rd ed., New York: Free Press, 1983.

⁷ Roger Silverstone, Eric Hirsch and David Morley: "Information and Communication Technologies and the Moral Economy of the Household" in Knut H. Sørensen and Anne-Jorunn Berg (eds.): *Technology and Everyday Life: Trajectories and Transformations*, Report No. 5, Oslo: Norwegian Research Council for Science and the Humanities, 1991; Merete Lie and Knut H. Sørensen (eds.): *Making Technology Our Own? Domesticating Technology Into Everyday Life*. Oslo: Scandinavian University Press, 1996.

⁸ Knut H. Sørensen, Margrethe Aune and Morten Hatling: "Against Linearity: On the Cultural Appropriation of Science and Technology", STS Working Paper 9/96, Trondheim: Centre for Technology and Society, 1996.

⁹ Per Østby: "Escape from Detroit. The Norwegian Conquest of an Alien Artifact", STS Working Paper 2/93, Trondheim: Centre for Technology and Society, 1993.

such an analysis less meaningful, not least because one may encounter a process where the meaning of context is redefined and transformed.

Nevertheless, we will try to perform the analysis on a dual front, partly to explore what aspects of Norwegian society can be invoked meaningfully as context, partly to analyse to what extent actors in the field try to redefine and reshuffle interests and institutions to construct what could amount to a new context. This is important because multimedia appears to be a technology that is part of strategies of redefinition and restructuring, not out of necessity, but because it may fit in with larger socio-political and economic concerns. At least, one could argue that this is the case on the basis of what seems to be "the third wave" of information society scenarios.

In turn, this approach means that our paper will study social learning in relation to multimedia in Norway. By this we mean to account for the processes of using, producing and making sense of the new technology. This implies an emphasis of both *spatial* and *temporal* aspects. In spatial terms, we face the challenge to understand how technologies are made to work when they are "displaced" into new locations through movements from laboratories to consumption, or from one country to another. The focus on the temporal dimension invites us to rectify an obvious and far-reaching weakness in most efforts to theorise the relationship between technology and culture. They tend to neglect its "micro-history" through their emphasis on the synchronous features of this relationship.¹⁰

We will try to do this analysis by looking at three domains:

- the learning economy of networks of producers and users, in particular strategies among different providers of services,
- the appropriating constituency of users,
- the constituencies of regulation, both public and private, that try to stabilise and control the domestication of multimedia in Norway.

By analysing the process as multi-level domestication, we will observe the interaction between technological and social change as reciprocal configuration. The work performed by the various actors engaged in this configuration is in some sense a process of searching in the blind, because too little is known about the socio-cultural potential of multimedia. The actors may do careful planning, like you usually do when you go fishing, but the outcome is no less uncertain. There will be experiments with new socio-cultural practices, there will be efforts to build new institutions and constellations, and there will be work done to regulate both technology (standards) and social relations. Thus, actors are into learning, and the role of the social analyst is to analyse what is learnt.

Interestingly, the development of Internet-based multimedia applications has created new methodological options for social scientists who study these phenomena. In fact, a lot of information about different actions and actors is

¹⁰ Knut H. Sørensen "Learning technology, constructing culture. Socio-technical change as social learning", *STS working paper* no 18/96, 1996.

available on the net. This is so partly because news providers allow for easy electronic retrieval of analytically relevant information, partly because actors leave electronic paths which the social scientist will be able to retrace.

In Norway, several news providers compete in bringing onto the web stories telling the latest news about the telecom, data and multimedia world. We were able to gather much of the data needed for this paper by downloading web pages as soon as these stories were presented. This manner of data collection is very convenient on the part of the researcher and gives rise to a very detailed account of the decisions and strategies of multimedia actors. The major drawback is the transient state of much of the material used. In the footnotes, we have included URLs as they appeared when the news stories were retrieved. However, it is a sad fact that after a couple of weeks, most URLs will have changed or become invalid, thus preventing readers from prying into many of the sources that we have used.

Even if the concept of multimedia has an international meaning, part of the analysis of the domestication of multimedia technology is to provide a local understanding. Thus, we continue our account by surveying how the concept of multimedia is understood in a Norwegian context and how this understanding can be used to provide some classification tools as well as a preliminary map of actors.

3. The nature of the beast: Defining multimedia

In a Norwegian context, there is no established definition of what characterises a multimedia application. The foremost exponent of Norwegian research in multimedia, Erling Maartmann-Moe, has stressed that the field is characterised by the presence of various technical components employed in constructing what is commonly perceived as multimedia applications.¹¹ Even so, he has admitted that a purely technical definition may not be the best because the field consists of a mixture of components taken from various disciplines that has not settled but will still be changing nearly every other week. Consequently, he has indicated that the field of multimedia can be defined through the knowledge base that it draws on rather than through its technical components. In taking this notion a bit further he has suggested that the typical multimedia worker ideally would have to be knowledgeable in computer programming, graphical design, man-machine interface, data networking (particularly Internet), CD-ROM technologies, sound and video editing, pedagogical methods, copyright laws, and also in how to apply multimedia in order to solve management problems. He has questioned the attitudes of Norwegian universities, which he has found deficient in defining multimedia from an interdisciplinary perspective.¹²

¹¹ Erling Maartmann-Moe: *Multimedia*, 3rd ed., Oslo: Universitetsforlaget, 1995.

¹² Erling Maartmann-Moe: "Kommentar: Cand. mult.", *Multimedia World*, 3 (4), pp. 4-5.

Needless to say, both these definitions of multimedia describe the field predominantly in technical terms, although some bits of law and management sciences have been added for good measure. While academic communities have challenged this technicist bias only to a small extent, the notion of cultural multimedia aspects has emerged several times in the media already. When the Norwegian Broadcasting Company (NRK) launched its weekly Internet radio programme *Radionettet* the aim was stated as describing "how technology influences our culture – in short our way of living and working". In particular, the program would try to investigate questions such as: "How do the Internet, CD-ROM and the new information technology affect us? What kinds of cultural impulses and ideals are conveyed? How does it influence the society, the culture, the aesthetics as well as the image that we hold of ourselves?"

It should be noted that this cultural slant also includes a non-determinist view on how technology can be influenced or appropriated: "Some people will object that all of it is just an American, technified, games-centred boy's culture. Others will say that information technology offers opportunities for us to put technology to good use the way we want in order to provide support for Norwegian language, culture, equality between men and women, and equal opportunities for everyone in our society of the future." In the journalists' own words, this aim was singled out as being the focal point of discussion in *Radionettet*.¹³

Another recent example of cultural concern in the media occurred when the newly started *Nettavisen*, an electronic newspaper with no paper-based counterpart, was accused of being a short-term phenomenon. One of its journalists retorted: "[...] will just remind our readers of a small revolution in another industry at the end of last century. Clever coopers – makers of wooden barrels – used to be in demand along the coast and in the valleys. Salted meat and fish were preserved in barrels. Then came the canning technology, and in one generation the coopers were out of business, while the food became better preserved and cheaper still for the consumers."¹⁴ This anecdote more than any testifies to the immense cultural impact that some of the proponents of new multimedia efforts believe in.

If signs coming from the media are anything to go by, it appears that the multimedia scene in Norway will concentrate more on the cultural shaping of technology and less on the technicalities in years to come. Multimedia will be defined by its locally produced contents rather than by its imported technical components. We can see this shift taking place as the press, the publishers and radio and TV companies adopt the new technology. As a spokesperson of *Nettavisen* said when confronted with some technical glitches experienced on the electronic newspaper's opening day: "I don't want to comment on Java

¹³ "Radionettet – Bakgrunn", <http://www.nrk.no/radionettet/info.html>

¹⁴ Knut Ivar Skeid: "Strålende mottakelse", *Nettavisen*, 3.11.1996, <http://nettavisen.no/>

applets and other technicalities that might not function. The contents are our concern.”¹⁵

Also, it is less certain that multimedia in a Norwegian context will be characterised by the emergence of a new media-based or technology-based discipline consisting of fragments of various other disciplines. This is so because we see a rapid integration of multimedia techniques into traditional disciplines and trades. Recent events prove that the technology adapts easily to existing social structures and can be applied within an established framework. One of the founders of *Nettavisen* implicitly emphasised this notion when he characterised his new electronic newspaper this way: “We have no intention of introducing revolutionary new concepts to journalism and the field of graphics. We are not re-inventing the wheel.”¹⁶

Even if, strictly speaking, the concept of multimedia implies applications involving a combination of several media components, it is also used when only one component or a simple form of presentation is involved, such as the peruse of text-based systems. Also, communication needs not be in dialogue form. Many present-day activities thought of as being multimedia applications are basically some kind of “simple retrieval”, such as the look-up of entries in a textual database or in a graphics archive. This is so regardless of whether the look-up takes place against a server on the net or locally from a CD-ROM or diskette.

Figure 3.1. Types of user interaction vs. communication types.

One-way communication Two-way/multi-way communication	Simple retrieval, e.g., look-up in CD-ROMs or databases, access to WWW links.	Presentation, e.g., most current WWW applications, CD-ROM encyclopaedias.
	Dialogue, e.g., making orders on the net, talkgroups on the net.	Full interactivity, e.g., educational applications and edutainment, games, video-on-demand.
	Single-media interaction	Multimedia interaction

The kind of multimedia applications that most people think of today as being typical, is based on two-way or multiway communication using numerous techniques for representing text, pictures, sound, animation etc. singly or in various combinations. Many such applications are edutainment or games in which the user is instructed or controlled by the program in order to attain a predefined goal. Often the combination of techniques is based on pedagogical

¹⁵ Are Halland: “Nettavisen lansert”, *Origo*, 1.11.1996, <http://www.origo.no/spinn/nettnytt/96/11/nettavisen.html>

¹⁶ Jofrid Egeland: “Rendyrket nettavis på luften”, *Aftenposten Interaktiv*, 1.11.1996, <http://www.aftenposten.no/hjemme/nyheter/nettavi2.htm>

principles instead of being left to the user. These applications are often described as having “full interactivity”.

Multimedia also comes in variations other than “simple retrieval” and “full interactivity”. “Dialogue” is a less advanced two-way or multiway communication involving a limited or straight-forward kind of presentation, e.g. the communication of text. Typical examples are the activities of talk groups or IRC (Internet Relay Chat) groups. Video conferences are another example based on simple real-time transmission of picture and sound.

Furthermore, there is one-way communication based on various kinds of representation, which we have termed “presentation” in figure 3.1. This type of application has proliferated recently as various kinds of encyclopaedias have been made available on CD-ROM. Most of the material that we retrieve on World Wide Web, such as newsbriefs, is of this kind. Often, such applications previously belonged to the “simple retrieval” category before they were refurbished and given a new lease of life. This kind of upgrading is often more easily undertaken than developing applications using two-way communication, which typically require no small degree of rethinking and innovation as well as the development of a well-defined goal.

Gradually, some applications classified as “presentation” will be developed into applications to be classified as “dialogue”. Today purchase offers are one of the most prominent examples of this type of development. Not long ago, the user was presented with no more than a description of the merchandise. Now he is also asked to fill in forms and answer various kinds of questions for the order to be processed and money transferred to the seller’s bank account. Automated bank services also fall into this category, and so do services permitting the search of databases using criteria chosen by the user, who is presented with the results of the search in real time. In the future we expect that a number of services will be confined to this type of two-way communication.

Probably, all multimedia actors will choose one or more of the categories in figure 3.1. as their explicit strategies, depending on what kind of services they want to develop. Even the most hardware-oriented network providers are likely to offer some kind of application, although their strategies will in some cases hardly be more ambitious than providing services classified as “simple retrieval”. The most basic form of “simple retrieval” is the gateway service based on the establishment of links, i.e. the provision of a catalogue of addresses allowing users to access the services of various other providers.

We feel that in the initial phase of the multimedia development, the evolving patterns are still much too rudimentary to warrant an unambiguous four-part classification such as the one illustrated in figure 3.1. Much work is being done by the multimedia actors and much still has to be done to develop “simple retrieval” applications into “presentation” applications or even into more advanced “dialogue” or “full interactivity” applications. Thus the current strategies of most multimedia actors are concentrated more or less intently on

following this path of development without deciding what type of communication they want to arrive at in the end.

Figure 3.2. Typical multimedia categories.

On-line	Off-line
Seek engines	Games
Daily news	Encyclopaedias
Purchase offers	Literature
Various kinds of information	Edutainment

This state of flux seems to demand that we adopt a simpler classification, at least as a temporary measure. Instead of concentrating on the degree of user interaction it seems plausible to adopt the dichotomy of on-line and off-line systems. This dichotomy seems to be more clear-cut than the categories in figure 3.1., at least for the purpose of analysing contemporary actor strategies.

Obviously, the emphasis today is on developing on-line systems. Off-line applications, as implemented on CD-ROMs and similar media, have not met with equal success. Nevertheless, there are still some differences in the focus of on-line and off-line strategies. Off-line systems are used mainly for games, encyclopaedias, literature (both fact and fiction) and edutainment. Such applications are by and large absent from on-line systems, which are dominated by seek engines, daily news as found in newspapers, purchase offers and information on more topics than you would ever want to read about. These types of typical multimedia applications are summarised in figure 3.2.

Since off-line applications are no longer the driving force of the multimedia field, this paper will concentrate on describing the development of on-line services. It must be said that a few Norwegian CD-ROM titles are still being issued every year, but investment in this technology is quite small and the quality of the productions has met with criticism. Some CD-ROMs are translations and adaptations of questionable quality, and some have been accused of being much too text-based or lacking in interactivity.¹⁷ Even if most new PCs are sold with a CD-ROM unit, the sale of CD-ROMs has remained low. Also, some publishers have announced that they are dropping or reducing plans for future CD-ROM productions.¹⁸

On the other hand, on-line services have enjoyed a rapid success, and a projected 250,000 households will be on the net before the end of 1997. Also, the value of the shares of the most successful innovators have risen noticeably on the stock exchange. Another indicator of success is the extent to which

¹⁷ Tormod Guldvog: "Den store CD-ROM-testen", *Origo Spinn*, 20.12.1996, http://www.origo.no/spinn/gyroskop/cd_rom/desember/

¹⁸ Tormod Guldvog: "Universitetsforlaget trapper ned elektronisk publisering", *Origo Spinn*, 27.12.1996, <http://www.origo.no/spinn/nettnytt/96/11/univforlag.html>; Jofrid Egeland: "Multimedia rent tap for Gyldendal", *Aftenposten Interaktiv*, 18.10.1996, <http://www.aftenposten.no/hjemme/nyheter/gyldndal.htm>

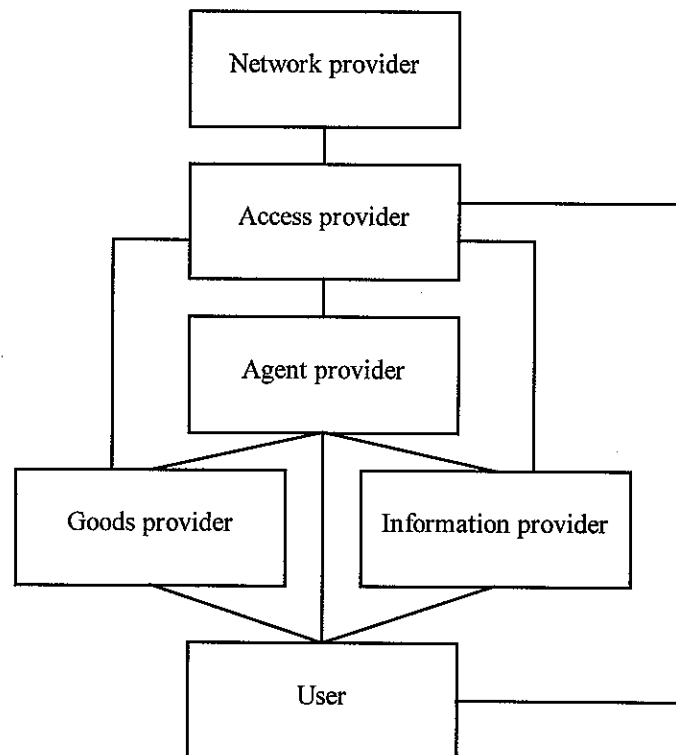
mergers are taking place and the expected entry onto the Norwegian scene during 1997 and 1998 of major international companies such as Global One and America Online. Such indicators point to the dynamics of on-line systems development and the importance of this field as far as domestication and social learning are concerned. For our purpose we feel confident in dealing only with the important on-line side of multimedia development when we go on describing and analysing the strategies of various actors.

Already, there are too many actors, small and big, actual and soon-to-be-expected, to defy enumeration. Some are private and some are governmental actors, although what used to be governmental activities in this field tend to be privatised and go commercial on short notice. Another distinction which no longer seems to be of much use is that of access providers and content providers. The trend is for access providers to expand their activities in the direction of content provision. Also, some content providers have been operating servers and networks of their own. Consequently, time has come for a more detailed classification of multimedia actors.

Among the content providers, it seems useful to differentiate between "goods providers" and "information providers". The traditional information providers are newspapers and government agencies, who still do not believe in getting much revenue from their services. The cost of operating these services are often financed by government funds or income from advertising applets accompanying the information contents. The "goods providers", on the other hand, depend on revenue from sales for their living, and will often maintain an automated mail-order catalogue from which the user can place his orders on-line.

What used to be thought of as access providers can now best be split into three categories: network providers, access providers and agent providers. Several new network providers will emerge as the monopoly of the Norwegian telecom, Telenor, as the owner of physical telecommunication networks is abolished at the end of 1997. As a result, access providers will have a choice of competing network providers when setting up servers to which users are connected. There will also be agent providers, who select for the users the kind of information they want and digest it, i.e. classify, summarise and reduce it to a systematic or convenient form. We call them agent providers because they operate advanced seek engines, so-called "intelligent agents", to process the information. Relationships between these three types of providers forming the infrastructure of the multimedia world will often appear as a hierarchy, as illustrated in figure 3.3.

Figure 3.3. The multimedia provider hierarchy.



Having chosen the classification that seems preferable, we will now give you an overview of what the Norwegian multimedia scene looks like at the beginning of 1997. However, the classification does not say anything about the strategies pursued by each of the actors. Before proceeding with the analysis of strategies and the efforts of structuring the map of Norwegian multimedia actors, it is necessary to give a short overview of the terrain where these strategies are formulated and implemented, i.e. the Norwegian context of multimedia development. At least on some indicators, Norway appears to be among the countries showing the greatest effort in appropriating multimedia. There is no obvious quality to be observed that explains this development in an unambiguous manner. Also, it is yet unclear to what extent Norway is domesticating the technology in a specific way.

4. Norway from context to paradox?

Arguably, Norway is a perfect spot for the diffusion of information technology. Apart from the fact that its population is small – 4.37 million inhabitants – it is sparsely populated, with a population density of 14.2 persons per sq. km. Situated at the northern periphery of Europe, its extension in a north-south direction is comparable to that of continental Europe from Denmark to the southern tip of Italy. In addition to its extreme length the country is also very mountainous with only 4 per cent arable land and many

fjord incisions. Thus, to overcome the topographical challenges, the need for modern telecommunications is considerable.

However, historically, Norway was no forerunner in the field of telecommunications. In a relatively poor and semi-industrialised country, the demographic and topographic characteristics mentioned above constituted a real problem. For a long time, the lack of up-to-date telecom standards was compounded by the initially private telephone company structure and the slowing down of infrastructure development due to the hardships of World War II. In the post-war period, priorities to develop major industries were emphasised, and telecommunications lost out. Consequently, nationalisation of private telephone companies proceeded slowly. Also, there were long backlogs of people applying for a telephone connection, and automation of the telephone network happened slowly.

In the last two decades considerable changes have taken place. Nationalisation was completed in 1974, and in the 1990s the Norwegian telecom, Telenor, has been transformed from a branch of public administration into a business-oriented company. Even if digitalisation of the telephone network is yet to be completed, Norway is now fairly advanced both in terms of technology, number of telephones per capita and even the costs of using telephone services. Moreover, the penetration level of mobile telephones is among the highest in the world.

Obviously, this change is related to changes in the economic situation of Norway. In 1994 the gross national product per capita was 212,452 kroner (about \$33,600).¹⁹ Compared to most other European countries, Norway has less unemployment (5.2 per cent), there is a trade surplus and the public finances are very solid. This is so due to the revenues of oil and gas production in the North Sea. At present, Norway is the second largest oil-exporting country in the world, tailing Saudi Arabia.

The industrial structure in Norway is dominated by a wide range of very small companies. Few companies are engaged in mass production of consumer goods. The industry is dominated by the production of bulk goods and raw materials. The electronics industry is highly specialised and niche-oriented, with marine applications as a stronghold.

While the general economic situation of Norway clearly facilitates the uptake of multimedia, its industrial structure is not particularly favourable. The industrial basis for multimedia technology is weak, and the industrial structure is not particularly conducive to the widespread use of this kind of technology.

The political attitudes towards multimedia are ambiguous. The political culture has been dominated by a Social Democratic party concerned with balancing the perpetuation of the welfare state against economic liberalism. Although there is a tradition of industrial policy, the government has never seriously pushed for a domestic high-tech industry. Nor have we seen concerted efforts to make the public sector technologically advanced. The

¹⁹ NOS: *Statistical Yearbook 1996*, table 256.

present policy has a noticeable liberalist flavour, spiced with serious efforts of deregulation, although the trend is less apparent than in several other European countries.

The main components of technology policy in Norway can be classified under headings such as general education, public support for R&D, and large investments in public infrastructure. The level of state ownership of industry is low and on the decline.

The level of general education is high, with 92 per cent on second level of scholarisation and 54 per cent on third level of scholarisation. 42.5 per cent of the cohort aged 20-24 are college and university students.²⁰ Total investments in R&D is about 2 per cent of GNP, and the public share of R&D expenditure is about 55 per cent.²¹

In Norway, public administration has a strong regional dimension. There are 435 municipalities, who enjoy considerable independence. In fact, the independence was so pervasive that during the 1950s and 1960s, the municipalities developed their own computer strategy, partly in opposition to central government.²² As a consequence, there is still no homogeneous or regimented public policy for the use of information technology in public administration.

Apart from such examples of diversification with a regional bias, Norwegian culture is rather homogenous along most measures, including language and religion. Still, Norway has for decades kept close cultural ties with the US and Great Britain. In particular, the US has been a supplier of cultural ideals, and English is the dominant second language. This means that there is a considerable sale of English-language computer programmes and CD-ROMs.

Due to considerable public subsidies, the cultural industry is fairly large. Norway still has 152 newspapers with a total circulation of 2.9 million copies. Typically, 84 per cent of the adult population read at least one newspaper daily.²³ TV penetration is fairly high, as 84.7 per cent of the households have one TV set or more. Cable TV is less common due to difficult topography and low population density and is partly replaced by the widespread use of satellite reception equipment. Presently, five television channels offer substantial national coverage. Also, long-term and sustained experiments involving regional and even local television channels have taken place.

Given the fact that Norway seems to be a front-runner in the uptake of multimedia technologies, the Norwegian context appears to be paradoxical. Along some dimensions, some indicators seem favourable to the development

²⁰ NOS: *Statistical Yearbook 1996*, table 139.

²¹ Computed on the basis of NOS: *Statistical Yearbook 1996*, table 156.

²² Jarle Brosveet: *EDB inn i kommunene: Kommunedatatanken i aktørnettverkperspektiv*, STS Report No.26/96, Trondheim: Centre for technology and society, 1996

²³ NOS: *Statistical Yearbook 1995*, table 217; NOS: *Norwegian Media Barometer 1995*, table 1.

of multimedia. In particular, the general economic conditions (GNP per capita), a high level of general education, and a relatively large cultural industry could be seen as supportive features. On the other hand, both demography and topography produce barriers, the industrial structure is not helpful, and technology policy is not particularly conducive.

Thus, we find it impossible to make judgements from the general features of Norwegian society about the way Norway domesticates multimedia and the speed at which the process is going. We need to look at other aspects of the situation in Norway. In particular, it seems to call for an analysis of the way that large Norwegian actors have moved in relation to multimedia.

5. Private sector actors and their strategies

The Norwegian multimedia scene is in a flux. We will give you a fair overview of the situation at the beginning of 1997 and indicate some of the projected development for 1997 and 1998 as well, at least as far as the participation of multinational actors is concerned. It shows that things have changed rapidly and that the development has happened in ways that were unexpected. Even as late as in the summer of 1996, it would be difficult to foresee the pattern emerging in 1997. This is so because the rearrangement of major actors groups took place all at once during the last months of 1996.

One of the interesting qualities of new technologies is their ability to act as catalysts of social change. New technologies may be used to redefine the situation in terms of what is doable, who may do what, what is challenging, etc. They may be domesticated into old structures, but there may also be room for radical change. This means that established macro actors may be cut down in size and influence, while small organisations may grow into new strongholds. As a consequence, the development of a new technology like multimedia has to be analysed at least at three levels:

- international
- national
- local

Our analysis needs to be read in this light. To follow private sector actors is to try tracing their movements between these three levels when they situate themselves in making experiments and in trying to make money.

The early history of data communications took place in the public sector.²⁴ In 1973, Norway and Great Britain were the first countries outside the US to be linked to Arpanet. Slowly, there emerged an academic net with extensions to academic communities in other industrialised countries. In Norway, Uninett was set up as a company with public funding to be responsible for net services to universities, colleges and research institutions.

²⁴ Pål Spilling: "Fra ARPANET til internett – en utvikling sett med norske øyne", mimeo, Telenor Research and Development, 1995; Bjørn Kvislie: "Internetts historie", 1995, <http://www2.gol.com/users/kvisli/hist.html>

As the biggest telecommunications project of its kind, Uninett had at the time exclusive access to Arpanet and its successor, Internet. Uninett had no commercial aspects, so companies wanting to communicate via the Internet had to document a strong relationship with academic R&D institutions at home or abroad. Access was denied to private users.

The situation changed in 1991 when some researchers in computer science at the University of Oslo and the Norwegian Computing Centre decided to establish a new company, Oslonett, that would offer easy Internet access to companies and private users. In 1992 they got their first customer, the National Association of Mechanical Industries, who wanted an intranet solution for its members. This solution was to be based on an electronic mail server and a gopher server. The other major customer was TelePost Communications, a now-defunct collaboration between Telenor and the Norwegian postal administration. According to Gisle Hannemyr, one of the founders of Oslonett, they were able early on to persuade Telenor to invest in the establishment of a commercial Internet service in Norway.²⁵

In 1993, Oslonett started selling Internet access to private users and had about 1,000 customers by the end of the year. The Lillehammer Winter Olympic Games in 1994 proved to be a major breakthrough. The web server set up was one of the first internationally to offer highly useful information. As a result, the Transatlantic bandwidth was filled to capacity and Sun had to set up a mirror site in the US. Gradually, new customers joined, and by the end of 1994 Oslonett had 4,000 users. However, the boom occurred during 1995, when their customer base expanded to about 10,000.

At the same time TelePost withdrew after a dispute about the gentlemen's agreement that TelePost should concentrate on serving the companies and leave private users to Oslonett. TelePost, or rather, its parent firm, Telenor, effectively denied Oslonett's customers the opportunity of full Internet access by blocking SLIP and PPP connections, and also refused to let Oslonett provide access by ISDN. Being acutely in need of more capital in order to invest in their own infrastructure, Oslonett started looking for a major telecom partner such as Swedish Telia or France Telecom. A merger with EUnet was also considered. Eventually, the Schibsted publishing group – a major media group in Norway – got interested. In September 1995 they acquired the firm, which was renamed Schibsted Nett.

From the autumn of 1995 until the autumn of 1996 there were only two major contenders in the Norwegian multimedia market: Telenor and Schibsted. Interestingly, Telenor expanded into content provision and Schibsted took on the task of being an access provider. However, as Telenor made a profit from their expanding activities, Schibsted suffered a great loss. In part, this was due to the decentralised nature of the infrastructure required on the part of the access providers. First, to provide cheap access, each of the contenders would

²⁵ Bjørn K. Bore: "Startet over en pizza", *Schibsted Nett Direkte*, 17.12.1996, <http://www.sn.no/snpub/SNDirekte/index.cgi?art=1100407&kategori=Nett%2dNytt>

have to install servers and modems in as many of Norway's 435 municipalities as they could afford, and also as fast as they could afford. Second, the influx of new users, partly as a consequence of campaigns offering cheap Internet connections, completely swamped the systems and made necessary frequent updating or replacement of the servers. The technically competent staff and the decentralised structure were a great asset to Telenor as a well-established telecom firm, whereas Schibsted suffered greatly from having to establish everything from scratch.

Schibsted realised that in a short time they would be the losing part in the contest with Telenor and other soon-to-come telecom actors. Being an access provider was not central to their core activities, only a means to other ends. Also, Telenor saw fit to deal several blows to Schibsted's long-term multimedia strategy. A particularly mischievous move during 1996 was the launch of a free on-line classified advertisement service for job vacancies and the sale of real estate, automobiles and boats. At the heart of Schibsted's long-term strategy were plans to make money from running similar on-line systems as extensions of the advertisement sections of their newspapers, which are among the biggest in Norway.

Schibsted acted quickly. Hardly more than one year after buying Oslonett, alias Schibsted Nett, they sold the enterprise to their major contender, Telenor, in November 1996. Reportedly, Schibsted had bought the firm for 20-30 million kroner and now received from Telenor 90-100 million kroner. The amount was believed to cover the accumulated loss, as well as a compensation of 25-30 million kroner annually for a couple of years. Generally, this was regarded as a very good deal for Schibsted, so why did Telenor make such a generous offer? Part of the answer will be found in the following account by one of the Telenor managing directors: "This area has been like a toy shop where one has bought a couple of modems and started up as an access provider. [...] The market has greater demands, and now we can concentrate on the potential for expansion inherent in Internet as well as sharpen our innovatory skills towards this goal."²⁶

If one should try to summarise developments in 1996, the first thing to be noted is the voracious appetite shown by Telenor in acquiring smaller competitors. With government approval they spent about six billion kroner buying other firms, expanding their own networks and investing in infrastructure abroad. Also, sales had risen from 13 billion kroner in 1988 to 23 billion kroner and was projected to increase to 30 billion kroner by 2001. In spite of the deregulation of all telecom services scheduled to start in 1998, some politicians, mostly from the Conservative party, were concerned that Telenor would still have a monopoly. Thus, competition would not be real.

²⁶ Pål Leveraas: "Glimrende butikk for Schibsted", *Internett Kanall digi*, 8.11.1996, <http://web.sol.no/kanall/digitele/pl11271947.htm>

They cited the huge investments and the firm backing by the Social Democratic government as a major cause of concern.²⁷

After the deal between Schibsted and Telenor, both sides allegedly were 'back to basics', which meant contents provision in the case of Schibsted and access provision in the case of Telenor. This was only partly true, as Schibsted's content provider, Schibsted Nett, was to continue as a Telenor company named Scandinavia Online. First, the change of the name indicated that the services would be expanded beyond the national borders. Second, as part of the merger, Scandinavia Online ended up with 50,000 Telenor Internet customers as well as 40,000 previously served by Schibsted Nett. This meant a market share of about 80 per cent and triggered an investigation by the Competition Surveillance Board (Konkurransetilsynet), a government body set up to prevent the formation of monopolies and cartels. In view of the competition expected when deregulation sets in, particularly the entry onto the Norwegian scene of multinational concerns, it is believed that the Board will not impose any sanctions on Scandinavia Online.²⁸

At the same time that Telenor established Scandinavia Online, its Swedish counterpart, Telia, decided that time had come to start moving into the Norwegian market. At short notice Telia acquired a small content provider, RiksNett, which had been owned in part by the union of Social Democratic newspapers. Telia paid 23.6 million kroner for this enterprise, which may seem a lot, because it had a customer base of only 10 per cent of the Internet users.²⁹ Obviously this fact did not matter much, because the strategy of Telia, as far as Norway is concerned, is to develop services for companies.

Of greater importance was the size and potential outreach of the network of servers and modems in 70 communities throughout the country that RiksNett had established. None of the remaining access and contents providers were equally well equipped. Also, Telia must have felt a strong urge to buy RiksNett before one of the other multinational companies moved in.

The events in 1996 led to the interesting fact that multimedia came to be very much dominated by telecom companies, in particular the national company Telenor, but also its Swedish competitor Telia. Clearly, these services were too demanding in terms of infrastructure and financial strength to be carried on by smaller companies. Also, potential competitors such as the cable TV companies seemed to lack access to a sufficient number of users to be able to compete. However, it should be noted that Telenor also owns a large part of the Norwegian cable TV network.

It is probably no accident that two large publishing groups, Schibsted and the Social Democratic newspapers, tried to enter the Internet provider

²⁷ Stein Aabø: "Vil bremse Telenors monopolspill", *Dagbladet på nettet*, 27.12.1996, <http://www.dagbladet.no/961227/nyh-3.html>

²⁸ Tore Neset: "Nettåret 1996", *Dagbladet på nettet*, 31.12.1996, <http://www.dagbladet.no/nettguiden/961231-guide-1.html>

²⁹ Elin Festøy and Christer Aasen: "Telia Norge kjøper RiksNett", *Origo*, 20.12.1996, <http://www.origo.no/spinn/nettnytt/96/12/riksnett.html>

market early on. This indicates that they interpreted multimedia as part of the media market, suitable for media know-how and services. But by the end of 1996, both groups had sold out. Both of them had been intimidated by the challenges of being both access and a content providers. Neither group published any plans about future multimedia initiatives, so it seems that they felt the need to spend time to rethink their positions and adjust their strategies.

Asked at the end of 1996 what he was unhappy about looking back at the rapid development of the commercial side of multimedia in Norway, Gisle Hannemyr, one of the founders of Oslonett, said: "I thought that the web would be more of a two-way channel, and that all receivers would also become senders. I did not believe that one-way media and entertainment would be so prominent, I thought useful applications would dominate more than they did."³⁰

If two-way communication is taken to mean full interactivity in every application, we still have a long way to go. Referring back to figure 3.1., we see that presentation is the most widespread multimedia category. There are very few on-demand applications to be found. Such applications take a long time to develop. Also, the capacity of ordinary networks is still too restricted for true interactivity on a grand scale. In addition, most people still find satisfaction in using less advanced applications and do not demand full interactivity.

Even so, new techniques are on the drawing-board to prepare for full interactivity. In particular, attempts are made to upgrade the capacity of telecommunication networks by combining Internet with ISDN or cable TV. In Norway, ISDN has been long in coming and is still more costly than an ordinary telephone connection. Towards the end of 1996 ISDN was offered as an option to Internet users, but at year's end no more than 7,000 users had signed up. Also, radical new approaches such as web-TV are still some way off. Web-TV using cable TV networks was shown to work at the end of 1996 but there are no signs that the idea will catch on in the near future. Most users of multimedia applications will still rely on modem-based PCs hooked up to the ordinary telephone network. Telenor is following up this trend by channelling Internet users into a newly adapted modem-based network, presumably packet-switched in part for the sake of effective digital communication, by the end of 1997.

It is expected that the number of Norwegian households with Internet connections will double in 1997, thus making more than 250,000 homes on-line. As a result, Norway will end up with one of the highest Internet densities in Europe, according to a Gallup survey made towards the end of 1996. Also, there are reports to the effect that four out of ten PCs sold at the beginning of 1997 are bundled with bargain offers consisting of a modem and an Internet connection. This trend contradicts reports coming from USA that the number

³⁰ Bjørn K. Bore: "Startet over en pizza", *Schibsted Nett Direkte*, 17.12.1996, <http://www.sn.no/snpub/SNDirekte/index.cgi?art=1100407&kategori=Nett%2dNytt>

of Internet users is likely to decline. It has been speculated that expectations raised vis-à-vis the new media are different in Norway compared to USA, thus leading to a different pattern of usage.³¹

As far as multimedia institutions are concerned, it is expected that major international actors such as Global One, Tele 3 and America Online will make their strategies in Norway known during 1997 and probably take some action. Also, Telenor will continue expanding as much as they can before the telecom monopoly expires at the end of 1997. Their goal in the next ten years or so is, through the co-operation with British Telecom and Tele Danmark, to secure a share of the Scandinavian telecommunications market of 40 per cent. Also, Telenor will be fighting fiercely if there is a risk of losing more than 30-40 per cent of the domestic market.³² In the same period, Telia expects to take 30 per cent of the Norwegian market, thus leaving very little to major multinational actors who might be moving in soon. It is expected that these big actors will be the future access providers, and that most of the smaller companies will vanish.³³

It is expected that the access providers will also be major agent providers. Currently, Telenor and Telia are reshaping Scandinavia Online and RiksNett to get rid of most of the contents in order to concentrate on gateway functions. This is a new strategy emphasising services that have not yet caught on among the users. Even so, the telecoms obviously have a strong belief in their ability to select and digest the information which they perceive is required by the users.

Following the rearrangement of access and agent providers on the Norwegian scene, the area of content provision is left in a formative state. No clear strategies have emerged, although the Orkla combine, one of the biggest in Norway, with ownership interests in a number of industries, has announced a direct marketing approach targeted at the households. Their concept is to unite several content providers into an electronic shopping mall. The concept is an old one even in Norway, where several malls are already operated with modest success by smaller content providers. It remains to be seen how the concept can evolve when promoted by an industry giant such as Orkla.³⁴

On the information side, Norway's biggest newspaper, *Aftenposten*, which is sold mostly by subscription, has felt confident to offer extensive news coverage. Most news items found in the paper-based version are also presented on the net and have been made searchable. They still keep their treasured

³¹ Christer Aasen: "Fordoblet nettvkst i 1997", *Origo*, 23.12.1996,
<http://www.origo.no/spinn/nettnytt/96/12/interbuss.html>

³² Anne Tollerud: "Kampen om telemarkedet", *Dagens Telecom*, 4.11.1996; Arne Joramo:
"Telenor aggressiv – Vil øke til 30 milliarder i 2001", *Dagens Telecom*, 5.11.1996,
<http://www.telecom.no>

³³ Rune F. Olsen: "Telia: 30 % markedsandel i 2005", *Internett Kanall digi*, 12.11.1996,
<http://web.sol.no/kanall/digitele/ro11710232.htm>

³⁴ Pål Leveraas: "Orkla med egen nettsatsing", *Internett Kanall digi*, 19.12.1996,
<http://web.sol.no/kanall/digimedia/hjemmenett.htm>

electronic archives, Atekst, going back to 1984, out of reach of the ordinary Internet user. The archives are open to educational institutions against payment.

On the whole, the issue of payment is guiding the efforts of most news media. Newspapers not being sold by subscription tend to reserve the best stories for their paper-based versions. Also, the owners of the fully electronic *Nettavisen* have expressed doubts as to whether they are ever going to make money from Internet readers or be content with making money from advertisements.

Currently, the efforts to domesticate multimedia in Norway have led to realignments and restructuring of many of the participating actors. The telecommunication companies, in particular Telenor, but with Telia following, have been able to get a solid hold on the market for providing access. Telenor's strategy, which is as much shaped by anticipation of deregulation of telecommunications as by multimedia developments, implies a dramatic change of the public service company into a diversified, high-tech combine. The resulting division of labour between access and content provision may not yet be stable, but it represents an interesting national configuration.

Development related to the supply of content in multimedia services is more complex. This is an area where small companies may have a better chance of survival, but the most prominent services are still outgrowths of relatively large, well-established companies that try to extend their services through the net. The efforts of many newspapers to provide electronic versions are a good example, but there are also other actors such banks, who launch electronic payment and banking services on the Internet.

We should recognise current developments as sustained efforts to learn, with an acknowledgement that risks may be substantial and that profits are uncertain. In many ways most attempts at supplying multimedia content are social experiments, and we will analyse them as such in section 7. The outcomes of these experiments are critical to the future of multimedia.

In an effort to explain the Norwegian fascination with PC-based technology, a number of factors have been enlisted, such as the high level of income and education, lower-priced PC equipment than in most other European nations, the recent bargain offers of modems by major access providers, and strong media focus on the benefits of the new technology.³⁵ Anyhow, it should be clear that multimedia has to deliver some gratification to future users if this growth shall be sustained. Social experiments are needed to identify such uses.

On the other hand, the public sector also plays an important role here. Probably, a substantial part of the social infrastructure in terms of knowledge, education, information sources, and communication networks will grow out of public services. Moreover, government could have an active role in promoting

³⁵ Christer Aasen: "Fordoblet nettvekst i 1997", *Origo*, 23.12.1996, <http://www.origo.no/spinn/nettnytt/96/12/interbuss.html>

the technology, such as the support of the Minitel by the French government. We will therefore turn to an analysis of the public sector, before returning to the issue of social experiments.

6. Planned fishing? The netted government

As previously mentioned, the government-supported Uninett for universities and colleges was a pioneering project of the late 1980s. This early initiative accounts for the fact that 26 per cent of the respondents with Internet access confirmed in a Gallup poll in the autumn of 1996 that the access point was an educational institution, see table 6.1. Also, one of the more notable web-related decisions made by the Norwegian parliament in 1994 was the pledge to provide every school with Internet access in a move called "the electronic classroom". However, this promise will take some time to fulfil, because most primary and secondary schools lack the funds necessary to acquire suitable PCs and to cover the costs of maintaining a permanent Internet connection. So far, only colleges and universities can offer their students satisfactory Internet connectivity.

*Table 6.1. Location of personal Internet access points autumn 1996.*³⁶

Location	Per cent (N=840)
At work (non-educational)	47 (395)
Educational institution	26 (221)
At home	25 (214)
Other places	12 (101)

On this basis, it seems clear that the Norwegian government has championed the domestication of the internet in two ways. First, it has provided the financial basis of the development of a national knowledge base to operate the technology. This is a rather traditional role, related to public investments in R&D. Second, due to the expansion in tertiary education, a large section of the younger cohorts have experienced the opportunity of using the Internet. In this way, the government has supported a rather large avant-garde group which may prove of great importance in the domestication of multimedia.

Of course, even Norway has its information technology policy which is more or less in step with the EU and other OECD countries. While the early 1980s were spent fumbling, investments in IT projects in order to strengthen and broaden the scope of the domestic IT industry was a major technology programme of the Norwegian government during 1987-1990. In retrospect it

³⁶ Rune F. Olsen: "Gallup: Tilgang på internett", *Internett Kanall digi*, 20.11.1996, <http://www.sol.no/kanall/digimedia/ro12329248.htm>

can be concluded that the efforts did not lead to much new activity, even if considerable funds were spent in the process.³⁷

Undaunted by the meagre results of the first programme, a second government programme is in the pipeline. Whereas the first programme stressed the importance of higher education and hardware-oriented industry production, the new one seems to be more oriented towards the multimedia world, stressing the importance of netbased applications and the cultural aspect associated with the use of computer technology. The title of the initial government report outlining the perspectives of the new programme is "The Norwegian IT highway" and proves that the domestication of technology is becoming a major concern even for the politicians.³⁸ However, it remains to be seen to what extent this perspective will be reflected in the details of the projected government IT programme when it is finally published.

Apart from the somewhat misguided efforts of the first government IT programme to support a large-scale computer industry, many projects in the public sector have been rather piecemeal. This is particularly true of projects of a multimedia character. Generally, the bureaucratic "line principle" is applied, meaning that the individual ministries and their respective agencies are responsible for implementing solutions within their own fields. As a notable exception to this principle, there is a Central Information Service taking care of services to central government bodies in areas where considerations of quality, cost-benefit or preparedness indicate that centralised solutions are to be preferred.³⁹

All ministries have access to the Internet, a central government network is being developed, and a network service to regional bodies was launched in March 1996. Many of the networks serve internal purposes, such as the distribution of messages by electronic mail and the announcement of regulations by means of home pages. Priority has not been assigned to developing services for external communication. While serving external purposes, the ODIN service (Official Documentation and Information in Norway), announcing major actions and policy measures taken by the ministries, is at least as important internally as it is externally. Also, much effort has been spent on developing basic standards rather than developing services. Examples of recent standards are NOSIP (Norwegian OSI profile, the basic specifications for government computer systems), NORBAS (framework for utilising open systems in public administration), EDI (Electronic Document

³⁷ Trond Bruland: *Den store IT-planen: Norges satsing på informasjonsteknologi 1987-1990*. STS Report No. 27/96, Trondheim: Centre for Technology and Society, 1996.

³⁸ *Den norske IT-veien: Bit for bit*. Oslo: Ministry of Transport and Communications, 1996, <http://odin.dep.no/html/nofovalt/offpub/utredninger/it/it-veien/>

³⁹ "Central Government Information Policy", report, Oslo: Ministry of Government Administration, 1994, http://odin.dep.no/ad/publ/st_ipole.html

Interchange) applied to health administration and customs work, and NISE (standardised gateway function for accessing electronic files).⁴⁰

ODIN has been described as a “full-scale experiment”. It is a simple retrieval application based on texts such as government press releases, speeches of ministers and the occasional government report. The best thing about ODIN is that the documents are now more readily available than they used to be. A preliminary evaluation one year after the launch showed that 86.5 per cent of those asked found ODIN to be a better service than traditional channels of information.⁴¹ Ordinarily, ODIN has about 10,000 accesses daily, but a record 44,000 accesses occurred during the first weekend in October 1996, when the government budget was presented. A spokesman of the service said: “In my opinion Norway has the best and most comprehensive service of its kind in Scandinavia, may be even in the Nordic countries.”⁴²

Even politicians have started using the Internet as a means of communicating with the public. By the end of 1996 all members of parliament had been connected to the net, but a survey showed that they approached the new medium cautiously. 60 per cent of the members of parliament would like to regulate information provided via the Internet, and 61 per cent of those asked had not done any browsing yet.⁴³ Viewed from another angle, the Internet still seemed to be an attractive proposition. A couple of party conventions were transmitted live via the Internet, and Prime Minister Thorbjørn Jagland took time out on several occasions to have interactive chats with Internet users. He admitted: “Using the Internet is a very fine way of communicating, although it is a bit slower than a telephone conversation.”⁴⁴

Government plans for the next few years seem to emphasise multimedia applications that are simple retrieval and designed mainly for internal use. Several such projects are underway. One of the most important seems to be SRI Net for connecting central and regional state authorities, and KOSTRA for managing information interchange between the government and the municipalities. It should be noted that these two applications came fairly early in the development of public sector use of multimedia techniques.

Also, the government intends to support selected projects in the private sector, such as pilot projects related to tourist industry marketing and telecommuting. One of the efforts supported by the government is termed NIN (National Information Network) and aims at attaining such vaguely defined goals as a higher quality of life, increased user participation and sustainable

⁴⁰ Anne-Lise Hilmen: “Regjeringen – en pådriver for en framtidsrettet teknologiutvikling og anvendelse”, paper, 28.11.1995, <http://odin.dep.no/ad/taler/hi951128/>

⁴¹ *Ibid.*

⁴² Jofrid Egeland: “Rekordhøyt besøk på Odin”, *Aftenposten Interaktiv*, 9.10.1996, http://www.aftenposten.no/hjemme/nyheter/sta_odin.htm

⁴³ Are Halland: “Politikere vil helst regulere”, *Origo*, 9.9.1995, <http://origo.telenor.no/spinn/nettnytt/saker/96/september/storting.html>

⁴⁴ “Gleder seg til internett-møtet”, *Verdens Gang*, web edition, 22.1.1997, <http://www.vg.no/vg/97/01/22/04nettja.html>

growth in various industries. More to the point, the range of twelve project areas to be supported is detailed in figure 6.1.

It remains to be seen to what extent the government will be supporting these twelve areas. It is expected that much of the support eventually to be made available will be research funds at the disposal of the Norwegian Research Council or, more likely, part of research programmes under the auspices of the European Union. Obviously, much of the financial support will be deferred until the projected government IT programme is announced.

*Figure 6.1. National Information Network (NIN) project areas.*⁴⁵

Electronically based trade using EDI
National road traffic information network (VITN)
Electronic marine navigation
Information network for geodata in local authorities
Information network for the construction industry
Information network for the oil sector
Data-based network for smaller firms
Network for co-operation and marketing in the tourist trade
Tele-medical network
National environment information network
Telecommuting/home office concept
Technology for national information networks (HUGIN)

Presently, the Norwegian government seems to be engaged in a policy development process mainly concerned with the promotion of the use of multimedia technologies, including the Internet, as well as the development of productive and profitable services. When the Minister of Planning, Bendik Rugaas, recently made a statement to the Norwegian parliament about government IT policy, he made views known which are proofs above all that the government is getting rid of determinist arguments as the backbone of its IT policy. Technological development is not just something that happens, it is shaped. Also, he emphasised the following principles:

The Government will lead a policy where Norway is at the front and exploits every opportunity. A progressive policy is the best strategy to avoid or limit problems that might emerge, and to find tools to support our social goals. This strategy must be based on our values, our attitudes and our common cultural basis. We are particularly concerned that the individual should be able to cope in times of change and also feel socially secure when experiencing major social changes. Everyone should have the opportunity to make use of possibilities that are created. Education, lifelong

⁴⁵ Anne-Lise Hilmen: "Regjeringen – en pådriver for en framtidsrettet teknologiutvikling og anvendelse", paper, 28.11.1995, <http://odin.dep.no/ad/taler/hi951128/>

*learning and competence are key factors in the Government's policy to meet these challenges.*⁴⁶

There is also a particular concern to avoid that the new technology is used in ways that reinforce, or even strengthen, social inequality. This means that there will be focus on the issue of getting access, but it also points out gender, social status, and regionality as important issues. Thus, the development of multimedia is, ideologically speaking, situated in a quite traditional form of Social Democratic discourse.

However, in concrete terms, there are few new policy initiatives to be found. This fact may in part reflect the impact of the international wave of liberalism and deregulation, but probably it can also be looked upon as an expression of a feeling that the government may be side-stepped by private sector actors. The greatest paradox here is the role of Telenor, which in theory is controlled by the government. In practice, Telenor seems to run circles around the Ministry of Transport and Communications.

Still, several government initiatives will be important. The use of Internet and multimedia in public services represents a major effort to integrate the new technologies into everyday administrative practices. Clearly, this trend will have impacts on the private sector. Specialised applications in the mainly public health services, like tele-medicine, is putting multimedia technologies to use in ways that might influence other areas at a later date. Last, but not least, education will provide a very important ground for learning how to provide remote teaching through the Internet and other kinds of multimedia. In this area, there are currently public as well as private initiatives, and within the public education sector, there are both central and local activities.

7. Social experiments

The fast development and proliferation of multimedia applications, particularly those using the Internet, seem to imply that social experiments and trials in the traditional manner are easily dispensed with. We have outlined the typical strategies of multimedia actors in figure 3.1. to show that transition from paper-based to electronically based communication can be effected gradually without following a pre-tested pattern. Also, the costs of adopting the most basic forms of one-way communication are negligible in most cases. For these reasons experiments and trials will often be regarded as irrelevant when it comes to testing the technical, economic and social feasibility of new multimedia applications.

This attitude is evident especially among the goods providers, many of whom have been eager to display their merchandise on the net without waiting for recommendations based on trials. This is so even if goods providers could

⁴⁶ Bendik Rugaas: "IT-politisk redegjørelse", parliamentary speech, Stortinget 28.1 1997, <http://odin.dep.no/psd/taler/97/970128.html>

benefit greatly by waiting for various principles to reach a certain level of maturity through experiments. In particular, there are crucial factors to contend with such as the principles and techniques of multimedia presentation, easy-to-use software for constructing and maintaining web pages, and new procedures using the yet-to-be-established SET (Secure Electronic Transaction) technology for effecting credit card payments.

Even if many hastily set up electronic malls will act as a replacement for social trials, a few such endeavours seem more important than others. A few firms have started experimenting with on-line ordering systems combined with express delivery by the Post Office. In this way even one of the biggest grocery chains, Rema 1000, has seen fit to undertake what amounts to an uncontrolled social experiment in order to investigate the potential of the web in changing customer behaviour. Home shopping on the web combined with fast delivery by the Post is believed to be a way of further reducing the network of retail grocery stores and increasing profits.⁴⁷

Among the research institutions, the Norwegian Computing Centre is viewing such trials in a broader and more systematic perspective. Their ELCOM research programme is concentrated on the study of open networks as the marketplace of the future. The main goals are building pilot applications and accumulating new, strategic knowledge on technology issues such as standardisation and electronic payment, policy and legal issues, business concepts, business processes and market mechanisms, as well as human resources involved.⁴⁸

As far as information providers are concerned, multimedia applications seem to develop in a rather haphazard manner without regard to changes in style and structure required by multimedia presentations. Again, the piecemeal strategy shown in figure 3.1. is in evidence. Many information providers seem to be content with converting their presentation brochures into a set of simple text files displayed as home pages without employing much in the way of multimedia techniques. Again, it is doubtful if much can be gained in the way of systematic knowledge and social learning from such unplanned trials.

As mentioned above, ODIN has been characterised by the initiators as a full-scale experiment. In common with many such would-be experiments, ODIN entered the production phase almost immediately. Also, strategies typically made use of in ODIN are simple retrieval and presentations based on unsophisticated conversions into electronic form of paper-based government documents and reports. In many cases, the paper-based presentations still seem to be a lot more important than the on-line equivalents, which suffer from an apparent lack of style and structure.

The same comment is valid for the less elaborate newspapers now on the web, in which the contents of the electronic and the paper-based versions are

⁴⁷ "Rema 1000 først i Norden med dagligvarehandel på internett", September 1996, <http://www.sn.no/remal>

⁴⁸ "Electronic Commerce in Open Networks", <http://www.nr.no/gem/elcom/elcom-e.html>

often quite identical. The Norwegian newspaper designed as a fully electronic experiment without a paper-based counterpart is *Nettavisen*. However, as of today *Nettavisen* has not developed beyond the simple retrieval of current news items. There are no archives to search, the pictorial content is low, no attempt has been made at offering news-on-demand, and the multimedia components of sound, animation and video are missing. In this way the so-called experiment is limited to investigating the profit side of running an on-line version of a simple updating service reminiscent of those offered by traditional news agencies, rather than introducing new concepts of social learning.

A more adventurous experiment in the field of mass media is LAVA, a pilot project for the on-line distribution of TV programmes in ATM (Asymmetric Transfer Mode) technology initiated by the Norwegian Broadcasting Company (NRK) and the Norwegian Computing Centre. The transmission uses MPEG compression technology, which, when run on powerful client machines, meets the requirements of video publishing over the network. The project aims at competence building amongst researchers, competence transfer to the industry and potential user organisations, as well as technology development in its own right. In addition, the project provides students with impulses from new technology under development. When the service was launched in December 1995, it was the first attempt ever to publish TV programs based on real-time video transmission on a regular basis. Today, local digital video news from north Norway is published daily on the Internet.⁴⁹

From a political point of view, education and re-education are considered to be important factors in the society of the future. Concepts such as "the global classroom" and "the electronic school path" have emerged, mostly as concepts without much substance.⁵⁰ It is a sad fact that after some over-ambitious and disastrous telecommunication programmes in the first part of the 1990s, which almost cost the Minister of Education his seat, information technology planning in the educational sector has progressed very cautiously. The main keyword is "normalisation", which, in political and bureaucratic parlance, is taken to mean no special ministerial task force and no extra IT resources.⁵¹

⁴⁹ "LAVA: Delivery of video in ATM", <http://www.nr.no/ekstern/engelsk/prosjekter/www.prosjekter.lava.html>; Daily broadcasts against registration (SUN platforms only) on <http://diplodocus.nr.no/LAVA/>

⁵⁰ *Den norske IT-veien: Bit for bit*. Oslo: Ministry of Transport and Communications, 1996, <http://odin.dep.no/html/fofovalt/offpub/utredninger/it/it-veien/>

⁵¹ Sindre Røsvik: 'Ten Years of Information Technology Policy in Norwegian Education', in David Tinsley and Tom van Weert (eds.): *World Conference on Computers in Education VI: WCCE '95 Liberating the Learner*, London: Chapman & Hall, 1995, pp. 855-862; Eva Tønnesen: 'Ingen penger til IT i skolen', *Computerworld Norge*, 43 (14), 29.9.1996, <http://www.computerworld.no/2856.html>.

As one of the few concrete measures taken, the government in 1992 established The National Centre for Educational Resources (Norsk læremiddelsenter, NLS) for the initiation of development and diffusion of new educational techniques. One of the first initiatives was the adaptation of educational software as part of the EPES project (European Pool for Educational Software), but today much of the activity is being concentrated on the potential of multimedia applications on the Internet, as well as acquiring more of a research profile.

A major event for NLS in 1996 was the opening of the School Network aimed at pupils and teachers. The network, when fully developed, will offer various kinds of educational material and guidelines relevant to learning in primary schools as well as talk groups or IRC (Internet Relay Chats). The idea behind the School Network is to make the classroom a more interesting place for students and teachers alike by introducing a strong “virtual” or multimedia component.⁵² Economics, Computer science, Consumer issues, Mathematics, Physics, English and Norwegian were some of the topics for which supplementary course material was presented electronically during 1996.

Also, the NLS participates in various multimedia projects such as the Internet database on the life and work of writer Knut Hamsun, in co-operation with the Norwegian Broadcasting Company (NRK), and the Viking Network Web.⁵³ The activities of NLS are expected to expand as tele-teaching becomes an major field in the next few years. Of particular interest during 1997 and the next three years will be the establishment of a government-funded programme for the development of research on and knowledge about the pedagogical use of information technology. The programme will establish relations with the universities so as to link up with current research activities.⁵⁴

Even if most access and contents providers will be rethinking their strategies in the light of the moves of the big actors towards the end of 1996, Telenor as market leader does not seem to be much ruffled by the woes of their smaller competitors. The list of Telenor’s most important research projects in multimedia and related fields is detailed in figure 7.1. Between them, Telenor and the Norwegian Computing Centre share the most interesting projects with a social experiment character, but only Telenor R&D, with 700 employees located at eight sites around the country, have the resources to carry out extensive field trials and engage in a wide range of research topics.

⁵² See <http://www.nls.no/>; <http://skolenettet.nls.no/dok/sn/english.html>

⁵³ See <http://www.nrk.no/hamsun/index.html>; <http://www.nls.no/viking/index.html>

⁵⁴ *IT i norsk utdanning: Arsplan for 1997*. Oslo: Ministry of Education, Research and Church Affairs, 1996, <http://odin.dep.no/kuf/publ/arsplan.html>

Figure 7.1. Telenor research projects in multimedia and related fields.⁵⁵

Distance education, e.g. prototype of an ATM-based electronic class room.
Virtual Reality, e.g. virtual model of Oslo's new international airport, Gardermoen.
Interactive TV, e.g. field trial of video on demand for 35 homes and locations in Oslo.
Conference services, e.g. interconnectivity of equipment for multimedia conferences.
Teleworking, e.g. theoretical studies as well as trials in a number of companies.
Potential trade-offs between teleworking and commuting.
Home office, e.g. empirical studies of different user groups in domestic settings.
'The Electronic School Path', offering Internet access via ISDN to every school.
Virtual Corporation, i.e. electronic flow and distribution of documents among firms.
Politicians' Channel, i.e. PC field trials enabling local politicians to send e-mail etc.

One of the adventurous projects carried through by Telenor R&D is the construction of a virtual reality model of Oslo's new international airport, Gardermoen. The model allows users to come in for a landing, to walk through the projected main terminal building or to enter into a virtual conference room where they will have access to various existing and future telephone services. The application will be used in the instruction of personnel at the new airport and also be available for multimedia-conscious passengers to toy around with.⁵⁶

Also, Telenor R&D has developed a futuristic virtual conference system. Users can connect to a host machine and enter into a virtual world shared with other users. Every user has a synthetic representation (an Avatar) that they can move and through which they can carry out tasks. Movements are updated for all participants simultaneously and two-way communication is supported. The system, if developed beyond the prototype stage, can be used on various types of networks (ISDN, ATM) and used for purposes such as entertainment, distance education, tele-conferencing or the remote control of various kinds of equipment.

Among projects having a more obvious social impact, Telenor have participated in a large-scale demonstration of teleworking in order to gain practical experience in trials involving a number of companies. Also, they have studied the potential trade-offs between teleworking and commuting in co-operation with the Institute for Transport Economics. Based on variables such as occupation and distance to work, the study developed a model which was tested in two urban regions of Norway. The study proved that there is a

⁵⁵ Compiled from "Multi-media development", <http://www.fou.telenor.no/xtf/english/eres95/multimedia.html>; "Users, markets and competition", <http://www.fou.telenor.no/xtf/english/eres95/usersmc.html>; "Network-based collaboration", <http://www.fou.telenor.no/xtf/english/eres95/network.html>

⁵⁶ See "Virtual Reality" under "Multi-media development", <http://www.fou.telenor.no/xtf/english/eres95/multimedia.html>

potential for a 3 to 6 per cent reduction in the number of commuters in the next 10 to 15 years if tele-working is sufficiently propagated.⁵⁷

No other Norwegian R&D institution can show a list of multimedia-related research projects such as the one in figure 7.1. Needless to say, the R&D department is considered one of the strongholds of Telenor as the company approaches the deregulation of telecom services in 1998. In their own words, their vision is stated as making research and development Telenor's foremost competitive strength.⁵⁸

Even if social experiments with multimedia are part of the strategies of private and public actors, it is still difficult to see a distinctive pattern. Most of the experiments are performed on the basis of a firm, but vague, belief that multimedia technology will be of major importance in the future. Consequently, actors go on exploring the possibilities of making new products based on this technology, or exploiting the potential for making services better or more efficient by means of multimedia applications. In this sense, most actors are undertaking fishing trips.

It is also unclear if the experiences from various social experiments are made use of by other actors than those participating in the experiment. Put differently, it seems that learning across experiments may not be very widespread or efficient. However, this observation has to be examined more closely before conclusions are made with any degree of certainty.

8. Conclusions: From fishing to farming?

The Norwegian domestication of multimedia seems to be well on its way, but the outcome is still undefined. We may safely conclude that multimedia will be integrated into a host of different social practices, but how, to what extent and with what consequences cannot yet be answered.

Necessarily, the overview just presented contains many simplifications. First, there are too many agent providers and contents providers – both of goods and information – in the market to be presented in a single chart. Second, several smaller access providers have been omitted. Third, there are more international relationships than could be visualised. Taking these deficiencies into account, figure 8.1. still provides a representative view of the present state of actors and their relationships on the Norwegian multimedia scene. The major access providers are Norwegian-based Telenor and Swedish-based Telia, both of them telecom firms owning dedicated contents providers, which they claim will develop very soon into typical agent providers.⁵⁹ Major

⁵⁷ See "Teleworking" under "Users, markets and competition", <http://www.fou.telenor.no/xtf/english/eres95/usersmc.html>;

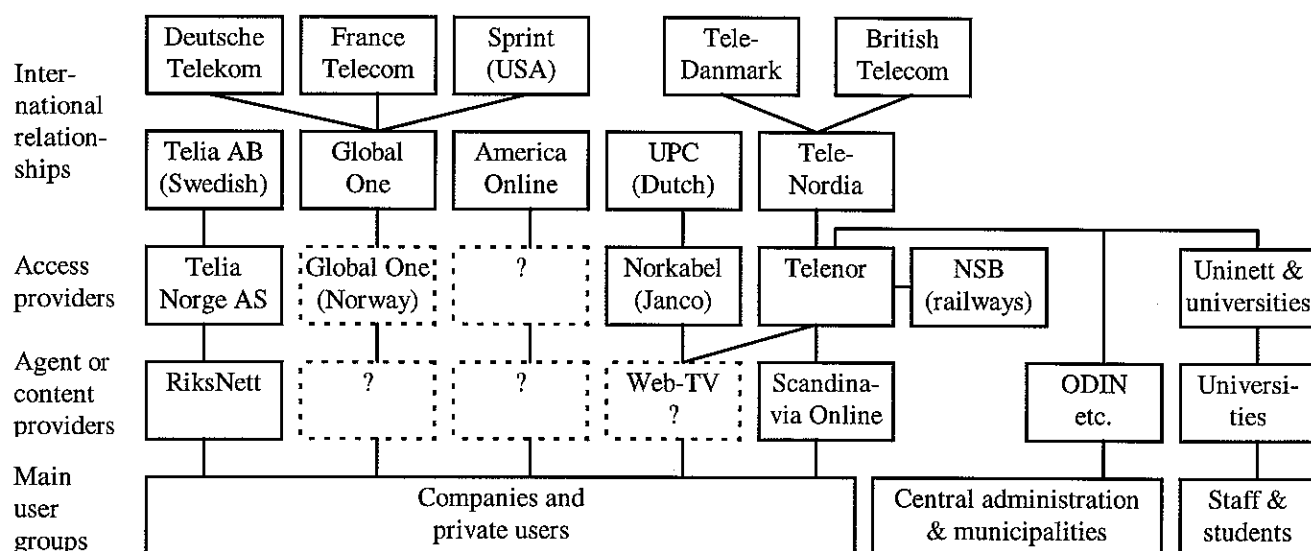
⁵⁸ "Telenor R&D", http://www.fou.telenor.no/xtf/fou_eng.html

⁵⁹ Morten Øverbye "Strever med strategiene", *Internett Kanall digi*, 16.1.1997, <http://web.sol.no/kanall/digimedia/mo17229458.htm>

multinational actors such as Global One and America Online are still lurking in the wings. Also, web-TV exists only in prototype form both from Telenor and Janco Kabel-TV, which emerged as the cable TV market leader after the merger with Dutch-owned Norkabel at the beginning of 1997.

The map of actors shown in figure 8.1. is designed to give some indication about the main ownership structure, as well as relationships towards international actors, even if there is a great number of very small companies in the categories of agent providers and content providers that cannot be fitted into a simplified map such as this one.

Figure 8.1. Map of major Norwegian multimedia actors 1997.



However, looking for specifics, it could be argued that multimedia is more of a tool or a means to providing or producing efficiently services or goods that are not multimedia in themselves. The emergence of this catalyst strategy could be attributed to the small population of the country. We note that there is no mass market for multimedia products compared to that of the US, Great Britain or Japan. This fact leaves the actors with two main options: either to cater for domestic needs where there is little or no international competition, or to develop specialised niche products. Our overview suggests that the first option is most prominent, at least at this stage, but this conclusion might well have been made on the basis of a certain bias or vagueness inherent in the available data.

With the possible exception of Telenor's highly aggressive acquisition strategy in 1996, we have characterised Norwegian efforts in the multimedia field as fishing trips. This is due to the fact that most efforts are of an experimental nature showing an unclear profit potential. Of course, there will be economic arguments supporting the need for such experiments. After all, profits are expected in a not-too-distant future to those who find smart ways of developing or using multimedia applications. Still, one might suspect that quite a few developers and users will be having fun in the process.

Farming is often looked upon as being the opposite of fishing, at least metaphorically. Farming implies emphasis on planning and hard, steady work. Fishing, while being haphazard, is very hard work while it lasts, but efforts have great fluctuations. Until now, fishing-style multimedia is what we can see. Whether farming-style multimedia will be possible, and what this concept will imply in terms of practices and uptake is still a thing of the future.