

Nordic parliamentary advisory bodies on biotechnology in the 1990'ties: A comparison of institutional arrangements and their modes of operation

Inge Ramberg

Norwegian Institute for Studies in Research and Higher Education (NIFU)

NIFU, Hegdehaugsveien 31,
N-0352 Oslo, Norway.
Ph: + 47 22 59 51 00
Fax: + 47 22 59 51 01
E-mail: inge.ramberg@nifu.no

This paper investigates Nordic parliamentary advisory bodies on biotechnology and their modes of operation with special emphasis on the Danish Board of Technology and the Norwegian Biotechnology Board. Rather well developed systems of participatory technology assessment in Denmark and Norway compared to those of Sweden, Finland and Iceland, may to some extent be attributed to variations in political cultures as well as different traditions of science policy advice and the political influence of the biotechnology businesses.

Introduction

Denmark has together with the Netherlands lead the development of participatory technology assessment (TA) in Europe. Constructive technology assessment (CTA) is characterized by dialogue and interactive public participation, originated in the mid-1980s from the Netherlands Organisation of Technology Assessment (now called the Rathenau Institute), but has also been developed by the Danish Board of Technology (Andersen and Jæger 1999).

Norway has since 1991 established two independent bodies conducting technology assessments with the intent to inform the government, politicians and the public and to raise debate. Both bodies have major elements of participatory technology advice. Especially the Norwegian Board of Technology, established in 1999, has participative TA as its central mission. Finland and Sweden on the other hand, practice expert TA alone. On the account of Iceland, there is only scarce information available on the establishment of a recent committee of bioethics following the adoption of controversial current policy which authorizes a private, for-profit-firm to construct and exploit a database for the population's medical records exclusively for the company's genetic research. (Greely 2000:153).

Internationally we find a large variety of technology advisory bodies that advise a diversified group of parliamentarian organs. The tradition of technology assessment (TA) started off in the 1960s in the USA and its primary proponent was the Office of Technology Assessment (OTA). This paper is not so much occupied with the traditional modes of TA – oriented towards early warning (*awareness TA*) of possible consequences of new technology or on the other hand strategic TA which aims for formulation of policy/ political alternatives – as of the two paradigms/ modes of European origin, namely *interactive TA* and *constructive TA* (CTA) (cf. Schot and Rip 1996; Sjøgren 1999).

Schot and Rip (1996:254) argue: "The form of these [CTA] activities relates to the Danish political culture where public involvement has always been considered important." Also Joss (1998:19) points out the cultural preconditions for the Danish model: (1) *high level of awareness and engagement of Danish citizens with respect to societal issues;* (2) *citizens self-*

consciousness about their rights and obligations; (3) the authorities build on citizen information and participation in their decision-making; (4) for almost a century no single political party has held a majority in the Danish Parliament.

This gives the point of departure for this paper which attempts to investigate the following questions: Can the comparatively well-developed systems of interactive and constructive technology assessment on biotechnology in Denmark and Norway compared to those of Sweden, Finland and Iceland, be attributed to variations in political culture in these countries? We are interested to explore on how the institutional arrangements of these bodies and their modes of operation varies, not only related to political culture but also traditions for research policy advice and strongholds of national research as well as the relative strength of the biomedical industry in the respective countries.

The Danish Board of Technology (DBT)

The Danish practice of participatory technology assessment has been described extensively in the recent years (Andersen and Jæger 1999; Jamison 1999; Joss 1998; Klüver 1995). In the following we will focus on formal institutional arrangements and the participatory practices.

Formal institutional arrangements

The Danish Board of Technology (DBT) is an independent body established by a separate law passed by *Folketinget* (the parliament) in 1995 and is the successor of the Technology Board, which was set up as a statutory body in 1986. Among the main tasks are the following: to disseminate knowledge about technology, its possibilities and its effects on people, on society and on the environment. The Board is supposed to promote the ongoing discussion about technology, to evaluate technology and to advise *Folketinget* and other governmental bodies in matters pertaining to technology. Every year, after a specific stipulation in the nation's "Finance Law", DBT receives an annual subsidy of around 10 million Danish *kroner* (recently the Danish government has cut down on the allowance from 13 million last year). The Ministry of Research is the supervising authority for the Board and the Parliament's Research Committee is the Board's steady liaison to the Parliament. Once a year, an annual report is submitted to the Parliament and the government.

The Board has a staff of 13 employees (2001) as well as a number of project workers. The Board itself is governed by two bodies of a total number of 60 representatives nominated by a number of NGOs formally appointed by the Minister of Research for a period of three years. The Board itself determines its agenda but regularly ask the public for suggestions. DBT has engaged in TA activities on most technological fields, including biotechnology (consensus conferences on genetic diagnostics in 2002 as well as genetically modified foods in 1999). DBT cooperates with other bodies on biotechnology through BIOSAM – a permanent coordinating organ on bioethics including the Danish advisory bodies on research ethics, as well as the Danish Board of Technology. The BIOSAM secretariat is located at DBT. BIOSAMs main task are to report on relevant developments on the research scene to the parliament and politicians in order to assist on their roles as lawmakers and participants in public debate. Secondly, BIOSAM shall facilitate the demand for new knowledge and co-ordination among ministries, governmental bodies and public institutions within the field of biotechnology. BIOSAM is presently being upgraded. BIOSAM activities includes *coordinating meetings, conferences and a newsletter to the parliament*. The organ also cooperates with DBT's *future panels* as well as *parliamentary hearings*.

Participatory models and practice

DBT activities focus on participatory TA. This paper uses the term *participatory* in the same meaning as the board itself: *methods involving people from outside the relevant expert circles, in order to give the process an assessor who has credibility in the eyes of the relevant decision makers* (Klüver 1995:42). Apart from participatory TA, Klüver also mentions *public debate* in addition to *expert-oriented methods* (like single expert analysis and cross-disciplinary expert group analysis) as the three groups of approaches. Public debate in the public arena initiated by the TA institution is in general considered to be a success factor of DBT-activities.

The board receives a large number of proposals each year, and the project proposals are evaluated as follows (quoted from the DBT website): "Before a project is launched it is estimated whether the subject is important - democratic, economical, or environmentally - for a lot of people. [Is there substantial] technological content? [Is] the subject controversial? [Is there] a need for decision-making? The item must be topical, it must be of interest for citizens and politicians, or there must be a need to raise it. And then the Technological council must have a decisive role to play as regarding the launching of the project (no one else has raised or is raising the question, or (...) our independent status can contribute with something special). All the projects of the [DBT] takes offspring in a method, eg. a hearing for the parliament, a consensus conference, or an expert working-group".

The consensus conference serves as somewhat like a trademark of the participatory TA activities of the DBT. Here, lay people are used as assessors because the Danish consensus conference deals with societal problems at a parliamentary level (Klüver 1995:43). The DBT also describes this activity in this way: "The Consensus Conference gives lay people the opportunity to assess a given technological development and make up their minds about its possibilities and consequences. The conference is conducted as a dialogue between experts and lay people and stretches over three days where it is open to the public. The final document is passed on to the members of Parliament. Bridging the gap between the public, experts and politicians is thus an important aim of the Consensus Conferences held by the Board. Topics which are suited (...) are characterized by: having current social relevance; presupposing expert contributions; being possible to delimit; containing unclear attitudinal issues". The following are examples of conferences: Genetically modified foods (1999), Teleworking (1997), Consumption and environment (1996), The future of fishing (1996), Gene therapy - what is feasible? What do we want? (1995).

While a consensus conference focuses on society's use and regulation of technology; a scenario workshop starts with a problem looking for solutions (Andersen and Jæger 1999:232) They describe the scenario workshop as a local meeting that includes dialogue between three types of actors: policy-makers, business representatives, experts and citizens. The Scenario Workshop has the following phases: criticism, vision, and fantasy. It is based on a presentation of possible future developments in the area. The criticism of the scenarios by the participants together with their own experiences form the basis for visions and action plans. The aim is to form a basis for local action, but also serves to gather knowledge about which visions the participants have on the given topic as well as their attitudes to the presented scenarios and their preconditions.

Other DBT-activities include the following categories: *Hearings for the parliament* (on gene plants (1996) on cloning of animals (1997). The hearings are arranged on request of the parliament; *Hearings of citizen groups* (the "Sustainable Growth – How?" project); *Future*

panels (- a kind of 'hearing' employed in connection with the project on Democracy and Welfare in the Aging Community); *Interdisciplinary Work Groups* (Technology Foresight (1998-99) *Interdisciplinary Work Groups* (Technology Foresight (1998-99)); *Policy Exercise - role play*; *Perspective Workshop* developing a strategy focussing on using analyses of strength, weaknesses, opportunities and threats (Information and democratic influence); *Voting Conference* (a type of city council - a type of conference where the participants including lay people take an active part; *Choice questionnaire* (surveys which aim at penetrating the different wishes of the population and ascertaining which have a high priority, and what means can be used to attain them applied in a project on food policies of the population).

The Finnish Parliament Committee for the Future

This committee has two tasks: it regularly prepares and submits a report to the government on the future of the country over the time span of 5-15 years. Also it organizes and coordinates technology assessment for the Parliament. This parliamentarian committee was set up in 1996 and has since 1999 been assisted by an employee of the Finnish National Fund for Research and Development (SITRA) on a permanent basis. Three projects were carried out until 1998, one of these addressed gene-technology in food production. Three projects are now in progress on "Aging people and technology", "Knowledge Management" and "Energy 2010...2030". Salo and Kuusi (2001) report on the Finnish Committee for the Future. Kuusi works as a TA advisor for the committee, set up in 1993, and now specialize in future studies and technology assessments, among them two expert TA projects on plant gene technology (1998) and energy sources (2001). Salo and Kuusi (2001:461) reports that "...the studies on controversial technologies, most notably plant gene technology and energy technologies, have stopped short of making recommendations."

The Parliament committee was initiated by *the Association of researchers and Members of Parliament*, founded in 1970, which now includes 100 MPs and 300 scientists according (Salo and Kuusi 2001). The association was inspired by a similar Swedish organization. Traditionally the Finns have relied on specialist advice and absence of lay audiences (Miettinen and Väliverronen 1999).

The Finnish Board for Gene Technology is another expert organ constituted by the Gene Technology Act (No.377/1995). The following information is quoted from the board website: "In addition to being a national authority in Finland, the board functions as a competent authority towards the European Community. It processes notifications concerning the use and release of genetically modified organisms as defined in directives 90/219/EEC, its amendment 98/81/EEC and 90/220/EEC, and responds to them within its authority to make legally binding decisions.

The board aims to promote safe and ethically acceptable use of gene technology and to prevent and avert any harm gene technology may inflict on human health, animals, property or the environment. Its priorities include processing notifications, issuing instructions and regulations, acting as a registration authority, preparing opinions and recommendations, monitoring, restricting or prohibiting the use of potentially dangerous organisms and imposing administrative sanctions to ensure its provisions are complied with.

The Board consists of a chairman, a vice chairman and five members who represent the Ministry of Trade and Industry, the Ministry of Agriculture and Forestry, the Ministry of

Social Affairs and Health and the Ministry of the Environment. Ethical expertise shall also be represented on the Board. The board is appointed for five years by the Council of State.”

The Norwegian Biotechnology Advisory Board and The Norwegian Board of Technology

Biotechnology was selected to be a Norwegian prioritised research field in 1985, and a co-ordinating organ for the research councils published an action plan the following year (Søgnen 1999:60). The government also commissioned an expert committee to investigate the need for governmental regulations in the field to handle security measures and environmental aspects. This committee suggested the establishment of an independent governmental advisory board either solely as an expert organ of researchers on biotechnology or as a broader expert-oriented body including members. The latter was finally approved by *Stortinget* (the parliament) in 1989 and finally put up in 1991. Coinciding with this process, the extensive structure of committees on research ethics by the research councils took place. The ethical committees on medicine as well as on natural sciences and technology, have consequently the responsibility to *research* ethics in biotechnology activities while The Norwegian Biotechnology Advisory Board (NBB) was commissioned to evaluate ethical issues and suggest guidelines for the *applications* of the new technology. Then in 1999, the Parliament established The Norwegian Board of Technology (NBT) with reference to the Danish Board of Technology after three years of consideration.

Formal institutional arrangements

Today NBB consists of 24 members appointed by the Norwegian minister of research and education and there are also observers from six ministries. The advisory board has approximately ten regular board meetings and organises two to three public conferences annually. Eight members of the board represent different public organisations. The main task of the Norwegian Biotechnology Advisory Board is to evaluate the social and ethical consequences of modern biotechnology and to discuss application that promotes sustainable development. Although formally an independent organ directed towards the government, NBB also has an advisory role for the Norwegian public authorities in general, including the parliament. The mandate also includes informative and debate-generating activities. The NBB has an annual allowance of about NOK 6 mill and the secretariat consisted of five employees in 2001

The Norwegian Board of Technology (NBT) has in its first three years been a subject to extensive political bargaining, which have influenced their activities. Shifting cabinets as well as parliament coalition partners since 1996 engaged in a struggle on the location as well as an extended mission for the NBT. This caused considerable problems for the board, which still has not employed a permanent director of the secretariat. This spring the parliament altered the revised mandate for the board issued in 2000. At that time The Ministry of Trade and Industry taken over the funding responsibility originally given to the Ministry of Research and Education. The mandate is now extended to include early warning and foresight activities. Also the Board is extended from 10 to 15 permanent members, with the five additional members with formal training in either technology or the natural sciences. The Parliament has finally settled that the board shall be located together with the NBB and the national committees on research ethics in Oslo. These latest developments have hopefully put an end to the conflict over the mission and institutional arrangements for the board.

NBT mission is formulated in this way on the board website: "The Board shall address technological challenges and the possibilities of new technology in all areas of society. It aims to stimulate public debate and to support the political opinion and decision-making processes. The Board monitors international technological development and the development of technology assessment methods (i.e. technology foresight methods, participatory methods etc.), and contribute so that Norway quickly addresses new technological challenges. The Board shall put special emphasis on lay-people's judgement, in assessment of new technologies. The Board shall impart the results of their work to *Stortinget* (The Norwegian Parliament), other authorities and society."

Participatory models and practice

Accordingly to the action plan of NBB the board is to give statement on its own initiative or on request to Norwegian authorities in accordance to the act on medical application of biotechnology and the act on gene-modified organisms. Five to ten *statements* are given annually and all statements are accessible to the public. NBB also publishes a *magazine*, *debate packages* and a *report series* on their activities. NBB combine expert-oriented and participatory TA. *Open conferences* and *public hearings* (including a parliamentarian hearing) as well as two *consensus conferences* with citizen panels in the Danish tapping have been carried through on GM-food in 1996 and 2000 and stem cells in 2001.

NBT recently organized an *open expert conference* on the use of modern medicine and biotechnology in top-level athletics (2002). Also, NBT organized a *scenario workshop* and *consensus conference* after the Danish model on Elderly people in the information society. Together with The National Committees for Research Ethics and Norwegian Biotechnology Advisory Board, the Board of Technology also organized a consensus conference on the topic of genetically modified food in 2000. This conference was a follow-up conference from an earlier consensus conference on genetically modified food held in 1996. The follow-up conference was arranged with the same panel as in 1996, but over a shorter time-span than a regular consensus conference. The lay-people panel especially addressed the topic of a national moratorium on genetically modified food, which they finally recommended with certain claims. Before the moratorium can be cancelled, the lay panel thought that a set of claims had to be fulfilled accordingly to the NBT website.

The Swedish Gene Technology Advisory Board

Sweden, on the other hand, does not conduct parliamentary participative technology assessment today. However, expert TA on health care issues are carried out regularly for the government by an independent body and the government also established a specialized advisory body in 1994. Also, The Swedish Gene Technology Advisory Board is appointed by the government and consists of 14 members. Seven are members of the parliament (*Riksdagen*). The other are nominated by two science policy institutions. The chairman and vice-chairman have to be experienced judges. Also one of the members needs to be a specialist of ethics. The main task of the body is to conduct advisory activities that promote an ethical and sound application of gene technology in order to protect life of animals and humans and the environment. In particular the body is to take actions to sustain a good climate for research policy. The body has an early warning function in relation to a number of governmental bodies and is required to submit an annual report to the cabinet on the latest developments on gene-technology.

The Nordic Committee on Bioethics – an advisory body to the Nordic parliamentarians

The Nordic Council established a separate advisory body in the extension of a Nordic collaborative research program in the 1980s. The Committee consists of two members from each of the Nordic countries and represents broad-based knowledge within the spheres of both biotechnology and bioethics. Chairmanship is rotated between members from the various Nordic countries. However, this expert TA-organ is rather anonymous on the Nordic scene in spite of the extensive mission cited below from the committees website:

“The Committee sets out to promote Nordic collaboration and the exchange of information between researchers, scientists, parliamentarians and opinion formers on ethical aspects of biotechnology research, development and adaptation by: Identifying ethical problems arising from genetic engineering and other biotechnology research, development and modification of micro-organisms, plants, animals and humans; promoting Nordic collaboration among researchers, opinion shapers and parliamentarians on bioethical issues by cooperating with national research institutions, authorities and ethics committees, and by the same token creating opportunities for the exchange of information: contributing to a joint Nordic debate on bioethical questions by disseminating material that can be used in constructive discussions of bioethics issues; monitoring biotechnological developments in the Nordic region and internationally; keeping abreast of Nordic and international debate on ethical questions issuing from biotechnology research, development and adjustment; as well as following legislative developments within the sphere of biotechnology in the Nordic countries. The Committee holds regular in-house meetings and can co-opt experts for the particular activity in hand. The Committee must arrange working parties, hearings, conferences, symposia and public talks/lectures in order to contribute to the exchange of information between researchers, parliamentarians and opinion leaders on current issues in bioethics. The Committee must publish reports and other writings incorporating material procured by the Committee in order to initiate Nordic debate on issues of bioethics.”

Summing up, participatory parliamentary technology assessment in the Nordic countries is only carried out in Denmark and Norway. In Finland and Sweden the TA-activities are solely expert-oriented like the activities connected to the Nordic Council described above. In the following, we will find that Iceland only recently have established a national committee on bioethics after a remarkable conflict over a national medical database.

Table 1: *Parliamentary technology assessment on biotechnology in the Nordic countries*

<i>Expert-oriented TA alone</i>	<i>Participative TA and expert-oriented TA</i>
<p>Finland: Parliament Committee on the future Board for Gene technology</p> <p>Iceland: National Bioethics Committee (as of 1999)</p> <p>Sweden: Swedish Gene Technology Advisory Board</p>	<p>Denmark: The Danish Board of Technology BIOSAM – coordinating body on biotechnology</p> <p>Norway: The Norwegian Biotechnology Advisory Board The Norwegian Board of Technology</p>

Discussion on possible patterns of variations in the Nordic countries

Table 1 summarized the different parliamentary TA-activities in the Nordic countries. Now we will discuss possible patterns in this variation. As proposed in the introduction, civic culture, and political culture in particular may be important factors for the institutional arrangements and their mode of operation. Therefore we also try to compare the country-specific constellation and the respective traditions for research policy advice and strongholds of national research as well as the relative strength of the biomedical industry in the respective countries.

Civic culture – traditions for 'peoples enlightenment' and public debate

The Nordic countries share strong cultural ties as a result of historical bindings between them for centuries. We find examples of unions between Denmark-Norway, Sweden-Norway, Denmark-Iceland as well as Swedish rule over the Finns. Collective historical references also in literature and art due to the influence of other Scandinavian languages, are evident. This has given rise to organised cultural exchange as well as extensive political and economical collaborative efforts among the Nordic countries since 1950s.

All the five Nordic nations have long standing traditions for representative democracy. The kingdoms of Denmark and Sweden were both regional powers for major parts of the 17th through 19th centuries. After that their power was weakened and Norway liberated from Sweden in 1905 (but was admitted its own constitution in 1814 and Parliament 1884) Iceland liberated from Denmark in 1918 (republic from 1944), while Finland liberated from Sweden in 1809 and finally from Russia – a civil war then followed before the republic was established in 1919 still under great influence by the Soviet Union up till the late 1980's.

Andersen and Jæger 1999; Joss 1989:19; Klüver 1995 all emphasize the Danish civic culture as a precondition for the participatory TA-activities. However, *Folkeopplysning* ('peoples enlightenment') is well known also in the other Nordic countries. The traditions for public debate are also hardly very different in Norway compared to Denmark or Sweden for that matter. Therefore, there may be other important preconditions for public debate like the degree of freedom of the press, and acts on public access to governmental records. In sum, the elements of a civic culture may hardly account for the choice of TA-practice alone. But let us consider the broader term 'political culture' in the same respect.

A power-sharing and consensus-seeking political culture?

Denmark, Norway and Sweden are all constitutional monarchies with representational democracy. Finland and Iceland are republics, partly due to serious splits in the socialist workers movements in the 1920 and 1930s. Like in most multi-party systems of the world, cabinets based on majority in the parliament are exceptional, also in the Nordic countries. The last party that held a majority in the Danish Parliament in the beginning of the 20th century (Toft 1996:174) but this is not unique for the Nordic countries. Lijphart (1980:83f) compared *average cabinet durability* in the period 1945-80 for 22 democracies including the five Nordic countries: He found the following results for the Nordic *minimal winning cabinets* – Denmark (34 months), Iceland (37), Norway (55) and Sweden (74) compared to traditionally oversized cabinet (Finland, 13mth on average in this period). This evidence may indicate that that there would be a greater need for participative TA in Denmark and Norway compared to Sweden when we exclude the presidential systems of Iceland and Finland. In the latter case Miettinen and Väiliverronen (1999:20) points out that "the consensus on science and technology policies in the 1990s can be seen as a continuation of the task of constructing the Finnish nation".

They also report on strong public trust in science in Finland and as well as strongly optimistic evaluation of biotechnology contribution in the future. They see the consensus on science and technology policy in the 1990s as “a continuation of the task of constructing the Finnish Nation. The policy seems to be accepted by the political parties and by the population at large”. Miettinen and Väliverronen conclude in the following way: “*There is a consensus on technology without any conference in Finland... Finland lacks the civic tradition of underlying democracy, dialogue and participation. As far academic intellectuals and researchers are concerned, the spirit of positive contribution to the national project has remained a prevailing attitude*”. Supposedly on the other end of the spectrum, we find evidence on the Norwegian political culture. Kallerud (1999:50f) remarks that Norway has an “assimilative political culture” with roots in the nation building processes into the 20th century assimilating counter elites and lay people. Such patterns may also be traced in Norwegian politics in the last decades. Kallerud mentions the cooptation of ideas from the feminist movement of the 1970s into public policies later on. Similar examples can be given on the environmental movement of the same period resulting in new ministries and the recruitment of critics in governmental bodies. Another distinctive feature is the extensive use of public hearings after expert panel suggestions aimed at NGOs as well as other stakeholders. This evidence may give reasons to suggest that there is a Norwegian tendency of incorporating public critique in governmental organs – this may have given rise to a higher public trust in governmental bodies on environmental policy including biotechnological applications than is measured for other European countries in the Eurobarometer studies on biotechnology (Kallerud 1999).

Tradition for science policy advice

We also find reasons to believe that the scientists relations to political life and science policy advice in general is conducive to the profile of the TA-activities. There are evidence of a long standing and still strong tradition for expert scientific advice in Finland and Sweden. Miettinen and Väliverronen (1999) also report on institutional ties between prominent scientist and Members of Parliament in Finland as well as Sweden. Likewise there are some indications that the Norwegian and also perhaps the Danish science policy advice have been weakened in the two last decades. The Norwegian government abolished the national science policy expert organ in 1989 and has never reinstated this body, but partly included this task as a part of the mission of the Research Council of Norway. However, this evidence is only indicative and further investigations are needed to conclude on this point.

A relatively strong bio-tech industry?

Finally, one might speculate that Finland, Sweden and Iceland have generated substantial business interest within the biotechnology sector. On the case of Sweden and Finland it is intriguing to suggest that the sector also has succeeded with their communication activities and laid a rather effective lid on the public debate so far. Actually the neglect by both scientists and businesses to Finnish consumer and nature organizations as well as civic organizations, has proved to wait out a critical organ called Genefood forum, which tried to raise public debate on genetically modified food (Miettinen and Väliverronen 1999). Sweden has probably the strongest biotechnology sector in the Nordic countries due to its pharmaceutical stronghold. However, several prominent Swedish researchers on biotechnology have left their country due to “Critique from certain elite groups plus popular scepticism as well as bureaucratic inertia” accordingly to Kasperowski & Elzinga (1999).

On the account of Iceland, we find a most interesting case: the government decision to authorize of an American private, for-profit-firm (*DeCode Genomics*) to construct and exploit a database from the population's medical records exclusively for the company's genetic

research. (Greely 2000:153). However, this has provoked the establishment of a citizen association, *Mannvernd*, the Association of Icelanders for Ethics in Science and Medicine. Mannvernd is the organized opposition to the Icelandic government's Act on a Health Sector Database (HSD). Judging from this case, one might speculate that the political influence of biotechnology businesses, especially in small countries, may be of great importance to the institutional arrangements of TA-bodies and their advice. In the Icelandic case, the firm in question also carried a seat in the National Bioethics Committee. Combined with low public interest and high trust in science and technology, the expert influence on national policies may in some cases be decisive.

Concluding Remarks

Rather well-developed systems of interactive and constructive technology assessment on biotechnology in Denmark and Norway compared to those of Sweden, Finland and Iceland may to some extent be attributed to variations in civic and political cultures. Traditions for science policy advice as well as the relative strengths of the bio-tech industry also appears to be of relevance to account for the variation of these bodies modes of operation. However, there is a need for more accurate evidence in order to explore further on these possible relationships.

References:

- Andersen, Ida-Elisabeth and Birgit Jæger. 1999. "Scenario Workshops and consensus conferences: towards more democratic decision-making" in *Science and Public Policy* vol. 26 (5): 331-340.
- Greely, Henry T. 2000: "Iceland's Plan for Genomics Research: Facts and Implications" in *Jurimetrics* vol 40 (Winter): 153-191.
- Jamison, Andrew. 1999. "On the Understanding of Science in Denmark – From public Debates to Institutionalized Promotion in Miettinen, Reijo (ed.) *Biotechnology and the Public Understanding of Science. Proceedings of the UK-Nordic Co-operative seminar. Helsinki, October 25-27, 1998*. Helsinki , Academy of Finland.
- Joss, Simon and John Durant. (eds.) 1995. *Public Participation in science: The Role of Consensus Conferences in Europe*. Science Museum, London.
- Joss, Simon. 1998. "Danish concensus conferences as a model of participatory technology assessment: an impact study of concensus conferences on Danish Parliament and Danish public debate" in *Science and Public Policy* vol. 25 (1): 2-22.
- Joss, Simon. 1999. "Public participation in science and technology policy- and decision-making – ephemeral phenomenon or lasting change?" in *Science and Public Policy* vol. 26 (5): 290-293.
- Kallerud, Egil. 1999. "Public Understanding of Science – The Norwegian Context" in Miettinen, Reijo (ed.) *Biotechnology and the Public Understanding of Science. Proceedings of the UK-Nordic Co-operative seminar. Helsinki, October 25-27, 1998*. Helsinki , Academy of Finland.

- Kasperowski, Dick and Aant Elzinga. 1999. Public understanding of science for democracy, some notes on the 'Swedish model'" in Lassen, Jesper. 1999. "Changing Modes of Biotechnology Assessment in Denmark" in Miettinen, Reijo (ed.) *Biotechnology and the Public Understanding of Science. Proceedings of the UK-Nordic Co-operative seminar. Helsinki, October 25-27, 1998.* Helsinki , Academy of Finland.
- Klüver, Lars. 1995. "Consensus conferences at the Danish Board of Technology" in Joss, Simon and John Durand (eds.): *Public participation in science. The role of consensus conferences in Europe.* London, Science Museum.
- Lejphart, Arend. 1980. *Patterns of Majoritarian and Consensus Government in Twenty-One Countries.* Yale University Press. New Haven and London.
- Miettinen, Reijo and Esa Väliverronen. 1999. "In science and technology we trust: on the public understanding of science in Finland" in Miettinen, Reijo (ed.) *Biotechnology and the Public Understanding of Science. Proceedings of the UK-Nordic Co-operative seminar. Helsinki, October 25-27, 1998.* Helsinki , Academy of Finland.
- Salo, Athi A. and Osmo Kuusi. 2001."Developments in parliamentary technology assessment in Finland" in *Science and Public Policy* vol. 28 (6): 453-464.
- Sanner, Helge. 2002. Response in *Folketinget* (Parliament) on 2002-01-21 motivating the government proposition to close down The Danish Board of Technology by the year 2003.
- Schot, Johan and Arie Rip 1996. "The Past and Future of Constructive Technology Assessment" in *Technology Forecasting and Social Change* 54: 251-268.
- Søgnen, Randi. 1999. *I lys av et norsk teknologiråd: Om internasjonal og nasjonal teknologivurdering. Empiriske observasjoner og teoretiske perspektiver:* [Constructing a Norwegian Board of Technology: On international and national technology assessment]. Report 2/99. Norwegian Institute of studies in Research and Higher Education, Oslo.
- Toft, Jesper. 1996. "Denmark seeking a broad-based consensus on gene technology" in *Science and Public Policy* vol. 23 (3): 171-174.

The Association of Icelanders for Ethics in Science and Medicine:

<http://www.mannvernd.is/english/index.html>

The Board for Gene Technology (SF): <http://www.geenitekniikanlautakunta.fi/e/index.htm>

The Nordic Committee on Bioethics: http://www.ncbio.org/Html/eng_index.htm

The Danish Board of Technology: <http://www.tekno.dk/index.php3?language=uk>
<http://www.biosam.dk/biosam/>

The Norwegian Biotechnology Advisory Board: http://www.bion.no/index_eng.shtml

The Norwegian Board of Technology: <http://www.teknologiradet.no/html/429.htm>

The Swedish Gene Technology Advisory Board: <http://www.genteknik.se/>