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Some Danish experiences.

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**From Grand Societal Challenges to policies and research priorities.
Some Danish experiences.**

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1 Introduction

This conference is about Future-Oriented Technology Analyses' (FTA's) role in dealing with grand societal challenges and in particular FTA's role in shaping and defining research and innovation agendas.

All countries are facing grand societal challenges such as increasing and volatile prices on energy and raw materials, climate changes, globalisation and rapid technological development. Some grand societal challenges depend on the country's geographical, political or economical place in the World. Small European countries face other challenges than China or India. Denmark shares many of the grand challenges with comparable European nations. Challenges such as aging populations, pressure on industrial competitiveness, migration, security, balances in governmental budgets, public health and potential pandemics – just to mention a few. Denmark also faces unique challenges such as decreasing revenues from the North Sea oil and gas recourses.

Just as the challenges differ between countries so differs the countries' ability and traditions to deal with these challenges. Again, small European countries deal with the challenges differently than China. It has previously been documented that there exists different regional styles in foresight activities (Keenan and Popper, 2008). But also between European countries national traditions and cultures within management and policy making differ quite much. For example, it is generally acknowledge, that Denmark has a strong tradition for consensus based policy making and a weak tradition of policy making based on systematic analyses of existing knowledge. This affect the way Denmark deals with grand challenges.

In the spring of 2005, the Danish Government launched a process, the Globalisation Council process. The aim of this Globalisation Strategy was to set up a strategy to meet the grand challenge of increased globalisation and to present a vision and a strategy for the development of Denmark to become a leading growth, knowledge and entrepreneurial society within an increasingly globalised world. The process led to a comprehensive strategy with the title: "Progress, Innovation and Cohesion Strategy for Denmark in the Global Economy". The strategy contained 350 detailed initiatives, which together would lead to comprehensive reforms of policies on education, training, research and entrepreneurship, as well as changes in the general framework conditions for growth and innovation. A major part of this strategy has subsequently been translated into legislation. One of the elements of Globalisation strategy was initiatives to improve the basis for the political priorities of the funding for strategic research. The Government (and the Parliament) aimed at a catalogue of themes for future strategic research to meet the society's long-term challenges — both threats and opportunities. This was the background for Research2015 process. A catalogue of 21 themes

formed the basis for the budget negotiations for the Fiscal Act for 2009 and 2010, where 11 themes were selected to receive funding for strategic research. Sustainability oriented research such as energy, environment, climate, climate adaption and sustainable transport & infrastructure accounts for 76% of the implemented priorities. In both cases, the Globalisation Strategy and the Research205 project, the impacts have been significant and to a wide extend measurable in new legislation and budget allocations. Furthermore, contrary to many national foresight and science priority-setting exercises the Research2015 project was exposed to a thorough evaluation.

Based on the experiences from the Research2015 project, the aim of the paper is to contribute to the discussion on FTA's role in dealing with grand societal challenges and in setting national priorities for strategic research in order to respond to the challenges.

The structure of the paper is as follows. Following this introduction, section 2 briefly resumes recent discussions of success factors for foresight projects and the potential of the classical rationale of foresight and FTA as a tool for shaping ad defining research and innovation agendas. Furthermore, section 2 touches upon the issues of national styles and traditions in foresight. Section 3 contains background information including 1) Danish traditions and styles in governmental long range planning and policy making, 2) Danish experiences with technology foresight, and finally 3) the Danish R&D funding system and its recent changes. Empirically this section is based on publicly available reports and internet information from relevant governmental bodies (ministries and agencies). Section 4 present the Danish Government's Globalisation Strategy and the process leading to this strategy as well as the Resarch2015 project. The section includes the process and use of FTA methods and for the Research2015 also the results of the project as well as the result of the formal evaluation of the project. Empirically the section is based partly on publicly available reports (in particular the web page of the Research2015 project and the evaluation report) and on personal information from involved key persons. In section 5 the major conclusions are resumed and discussed.

2 Success factors and national traditions for foresight

In recent years focus has been set on factors that might determine the impact and successful application of foresight (or FTA[1]). With the aim of analysing key success factors for government-led foresight projects Calof and Smith (2010) have analysed foresight and foresight-like projects and programmes in a nine countries (Ireland, Japan, Finland, UK, Denmark, Australia, the Netherlands, Germany and France.

Eight factors were identified as the critical keys to success in government-led foresight programs:
1. Focus on a clearly identified client.
2. Establish a clear link between foresight and today's policy agenda.
3. Nurture direct links to senior policy-makers.
4. Create strong public–private partnerships.
5. Develop and employ methodologies and skills that are not always used in other departments.
6. Ensure a clear communication strategy.
7. Integrate stakeholders into foresight programs.
8. Take advantage of the existence of, or create, a national–local academic receptor and training capacity.

These factors came about across the nine studied countries, and if they are equally valid in all the nine countries they must describe the lowest common denominator. The authors are aware of this and suggest that further studies should be made to validate the factors in different settings and also identify new ones. This is a bit beyond the intent of this paper, but in the remainder of this sec-

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[1] In the introduction to this conference FTA is defined to include foresight, forecasting and technology assessment.

tion we will look further into regional and national differences in foresight and more generally in planning and decision making. Furthermore, in section 4 of this paper the nine factors are used to sum up the Globalisation Strategy and the Research2015 processes.

National traditions for foresight and planning

In a recent paper Keenan and Popper (2008) have discussed regional styles in foresight. The key argument is that the way a foresight exercise is carried out reflects three factors. The first factor is the contextual landscape in which the foresight activity is embedded. This includes local economic, political and socio-cultural contexts that might differ from region to region. Keenan and Popper here focus on foresight as a political instrument and naturally make some simplifying assumptions on political traditions. This leads to a categorizing of countries in three distinguishing political traditions 1) established democracies as found in northwest Europe and North America, 2) third wave democracies as fond in Southern and Eastern Europe and South America, and 3) Asian democracies. The second factor is the history of foresight diffusion and adoption. The key point of view is here that history matters in the sense that foresight activities are often inspired by earlier activities in other countries. This leads to the categorizing of countries into 6 regions: Northwest Europe, Eastern Europe, Southern Europe, North America, South America and Asia. The third factor concerns data bias.

Cultural differences and styles are very hard to quantify, and it is even debated whether such items can be quantified at all. One of the most comprehensive and most established studies of national styles in management, decision making and planning is due to the Dutch psychologist Geert Hofstede. In his original study in the 1970's Hofstede analysed cultural differences based on attitude questions to IBM employees in 40 countries. The analyses have later been extended to other types of organisations and countries to cover 76 countries by 2010 (Hofstede & Minkov, 2010). In the original study Hofstede presented four dimensions to describe cultural differences: Large versus small power distance; Strong versus weak uncertainty avoidance, Masculinity versus femininity, and Individualism versus collectivism. See table 1. In a later work Hofstede have added a fifth dimension: Long-term versus short-term orientation. But data are only available for a much smaller number of countries, and no data is available for Denmark.

Dimension	Description
Power Distance	The extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally.
Uncertainty Avoidance	Tolerance for uncertainty and ambiguity; it ultimately refers to man's search for Truth.
Masculinity	Refers to the distribution of roles between the genders which is a fundamental issue for any society to which a range of solutions are found.
Individualism	The degree to which individuals are integrated into groups.

Tabel 1. Hofstede's cultural dimensions. Source: Hofstede, 1984.

The two dimensions are of special interest for this paper: power distance and uncertainty avoidance. For both of these dimensions Hofstede notes that they have obvious consequence for the way institutions and organizations are build and he discuss the implication of each dimension for management and planning. Several of these implications relate to the context of this paper.

The power distance dimension has implication for the societies' need for subordinate consultation. In societies with large power distance, 'rulers' de facto are less likely to consult with citizens. The concept of powers includes different types of authorities and their institutions such as government and large stakeholder groupings but also experts. Hofstede's power distance dimension to some extend corresponds to Keenan and Popper's distinguishing political traditions. Established democ-

racies in Northwest Europe and North America have in general the lowest power distance index. Third wave democracies and Asian democracies constitute two very inhomogeneous groups with no clear pattern of power distance. However, Hofstede notes that democracies are less likely to be found in countries with a large power distance societies. This supports the point of view that third wave democracies have a higher power distance than more established democracies.

The uncertainty avoidance dimension has several implications for national management and planning cultures. In particular three of these implications relates to foresight.

Types of planning used. Even among wealthy and highly developed democracies, it is possible to find differences in planning practices. In the more uncertainty avoiding countries (e.g. Japan and France), short-and medium-term scheduling and planning get more attention than in less uncertainty avoiding countries such as Denmark and Great Britain (Hofstede 1984, p94).

Meaning of time. The uncertainty avoidance dimension also impact the question of *how a society reacts on the fact that time only runs one way and that the future is unknown: whether it tries to control the future or to let it happen (Hofstede, 1984, p84)*. Countries such as France and Japan have a high uncertainty avoidance index consider time as money and that time should be mastered and exploited. Whereas countries with a lower uncertainty avoidance such as Denmark or Great Britain time is merely a framework for orientation rather than something to be mastered (Hofstede, 1984, p95).

Tolerance for deviant ideas. Countries with strong uncertainty avoidance *maintain rigid codes of belief and behaviour and are intolerant towards deviant persons and ideas*. Hofstede notes that in countries with a strong uncertainty avoidance deviant opinion on business, scientific, or political issues in uncertainty avoiding countries are associated with personal antipathies (Hofstede, 1984, p96).

Figure 1 shows a selected number of countries' score in power distance index and uncertain avoidance index. From the figure it is quite obvious that large differences exists even between established democracies in Western Europe. It is striking that a few clusters can be identified. An anglosphere cluster of countries (Great Britain, Ireland, USA, Canada, Australia and New Zealand) all have a relatively low index in both uncertainty avoidance and power distance. Opposite this a francosphere cluster of countries (France, Belgium) have a relative high index in both uncertainty avoidance and power distance. In between a germanosphere cluster (Germany, Schwitzerland, Luxembourg and maybe also Austria) is characterized by a relative small power distance and a relative strong uncertainty avoidance. Furthermore, it is interesting to note, that the included Asian countries all have a high relative large power distance but differs significantly with respect to uncertainty avoidance. Countries such as Japan and South Korea have relative high uncertainty avoidance indexes whereas other Asian countries such as Singapore, Hong Kong, China (and also India and Indonesia) have a low uncertain avoidance index. As can be seen Denmark is characterized with a very low index in both uncertainty avoidance and power distance. Among all 50 countries include in Hofstede's analysis Denmark rank as 3rd lowest in both uncertainty avoidance and power distance. Another Nordic country, Sweden, falling in the same quadrant as Denmark is added in figure 1 for comparison.

This challenges Keenan and Popper's factors for explaining variations and similarities in regional foresight data. The economical, political and socio-cultural contextual landscape of a country obviously affects foresight activities in that country. But the clusters of such landscapes might follow other factors than type of democracy. If issues such as the perception of planning, meaning of time and tolerance for deviant ideas are not shared by countries in the same region it might be difficult to conclude on analyses omitting these differences.

Furthermore, it challenges the role of the history of foresight diffusion and adoption across within and regions of many countries. Keenan and Popper's study indicates that such regional patterns exists, but each foresight activities of each country might to a higher degree reflect socio-cultural traditions of power distance and uncertainty avoidance than foresight traditions in neighbouring countries. A fact that Keenan and Popper explicitly are aware of.
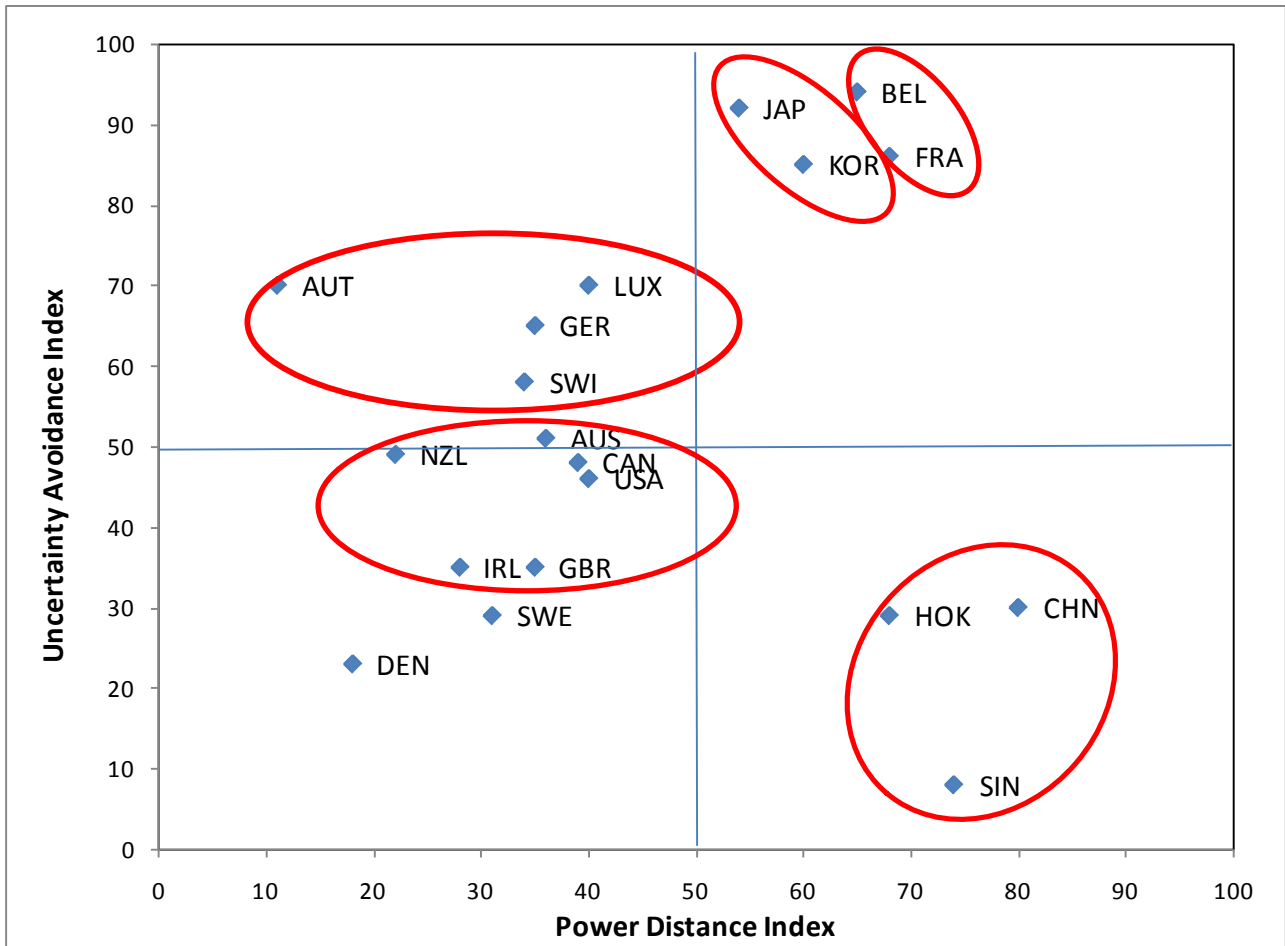
Figur 1. Uncertainty avoidance index and power distance index for a selected number of countries. Source: based on Hofstede (1984). The author of this paper is responsible for the selection of countries and for the indicative groupings.

National scores in both the uncertainty avoidance index and the power distance index might affect the user of foresight in at least two areas: selection of foresight methods and the inclusion of experts and of citizens. For example, we might expect low power distance societies to favour interaction (citizen consultation) based foresight methodologies such as Futures Workshops, Citizens panels and Conferences/Workshops. In high power distance societies we could expect expertise and evidence based foresight methodologies such as Expert panels, Interviews, Modelling and Literature reviews.

3 Background

As history and cultural context matters this section contains background formation to understand the Research2015 project. The intension of the section is also to sketch elements of Danish "style" in foresight.

3.1 Danish traditions and styles in governmental long range planning and policy making

Denmark has not been among the first countries to adopt foresight. This may be due to several reasons.

First, common wisdom tells that the Danish industrial structure traditionally has been dominated by small and medium-sized enterprises, which rather focus on rapid response to changing market conditions than on R&D and long-term planning. However, this common wisdom is not clearly documented, and changes might have happened during the recent decades. The private sector's investments in research and development increased from a level of 0.6 % of GNP in 1983 to approximately 2% by 2008 (Forskningsministeriet, 1997; Forsknings- og Innovationsstyrelsen, 2010).

Second, science and technology have traditionally played a less important role in Denmark than in most of the comparable OECD countries. As late as in the 1980s, the Danish governmental expenditure on research and development relative to the country's gross domestic product was among the lowest in the OECD countries. It applied to both public and private expenditure (Undervisningsministeriet, 1991).Today, Denmark are among the OECD countries with the highest governmental expenditures on research and development.

Third, during the 1970's Denmark had some quite negative experience with prospective planning. In the two prospective plans (Perspektivplan I and II) from 1971 and 1974, the government analysed social trends and developments 15 - 20 years ahead for the public and private sectors, respectively. The studies did not, however, foresee the oil crises and the economic crises in the 1970s, and this gave such analyses a rather bad reputation among economists and planners in the governmental administration. As erratic evidence, the author of this article has several times heard centrally place civil servants tell that they during their study-time in the 1970's and early 1980's leaned that forecasting was impossible and futures studies wasn't serious. It has supposedly affected Danish attitudes on the application of foresight as this took pace in other countries in the 1980s and 1990's.

Finally, Denmark has a weak tradition to base policy decisions on analytic analyses of available knowledge. Shortly before the new millennium the Danish Parliament took the initiative to launch a very large research project on Democracy and Power in Denmark. The purpose of the project was to analyze the state of the Danish democracy at the entrance to the 21st century. One of the conclusions of the study is that the basis for political decisions often bears the imprint of to be negotiated, rather than systematic analyses of the problems.

> *Denmark has never had strong traditions for basing political decisions on accessible knowledge – as opposed to Sweden, for instance. The scientific/analytical level in Danish white papers has generally been low. White papers have often seemed negotiated rather than analytical presentations of political issues. ..*
>
> *It almost seems as though there is a guiding principle a la "We'll figure it out as we go – we can always fix things if the there are unforeseen and unfortunate consequences."* (Togeby et al., 2003)

Furthermore the study concludes that the power gap in Danish society almost has diminished. This also applies to the citizens' relationship with the experts, whose authority has faded (Togeby et al., 2003). This conclusion supports the much earlier findings of Hofstede (1984) that finds that Denmark has very low power distance. This means that in Danish political contexts participatory and consensus elements probably have more appeal to policy makes than systematic and analytical elements. Togeby et al.'s conclusion also supports Hofstede's position of Denmark as a low uncertainty avoidance society. Especially the meaning of time in Denmark seems to be considered as a framework for orientation and not something to be mastered.

Experiments with technology foresight

In a green paper[2] from 1995 the Danish Council for Research Policy recommended that the Ministry for Science should consider utilizing futures studies in affiliation to its strategy processes. The council also recommended that the ministry assessed the international experiences in this area and referred to foresight programmes in UK, Germany, the Netherlands and Japan. In 1998 the Danish Board of Technology sat up an independent working group to analyze and assess the feasibility of a technology foresight programme in Denmark. In this study technology foresight was defined as "*dialogue activities and analyses of long-term developments in science, technology, economy and society with the aim of identifying technologies which may have economical and/or societal significance*" (Danish Board of Technology, 1999). The working group recommended the Danish parliament to launch a program for technology foresight with a budget of DKK 25 to 30 million over three years.

With the centre-left Government's business development strategy from 2000 a genuine technology foresight programme was established (Regeringen, 2000). In the strategy it reads: "*the Government will take the initiative to implement a project on technology foresight in Denmark. The aim is to increase knowledge and improve the decision-making base for investments in technology development in Denmark. For example, in connection with public investments in technological service as well as in connection with the larger interdisciplinary research groups*[3]". The term "technology service' refers to the activities of the Danish GTS institutes: nine independent research and technology organisations. Hence, technology foresight was seen as a part of the Government's business policy and not in particular a part of the science policy and the project was initially placed in the then Danish Agency for Business Development. The same governmental agency in 2000 sponsored a sensor technology foresight as a first experiment with technology foresight. Methodologically this was very much inspired by Delphi-based approach of the British and German national technology foresight exercises in the 1990's.

On the basis of the Government's business development strategy a pilot programme for was launched early in 2001. In the first place was that budget allocated an amount of DKK 24 million for the period 2001 to 2004. Following the general elections and the change of Government in November 2001 the ministries were reorganised and the technology foresight programme was moved to the new Ministry of Science, Technology and Innovation, and later on to that ministry's Agency for Science, Technology and Innovation. Also following the change in Government the budget for the technology foresight programme was reduced to DKK 18 million. Under this pilot programme nine technology foresight exercises was carried out in three rounds. Following the second round additional two exercises were carried out the Agency for Forrest and Nature and the Agency for Environmental Protection.

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[2] "Vejen til en national forskningsstrategi". Forskningspolitisk Råd, 1995.

[3] Author's translation from Regeringen, 2000, p52

Concerning the factor of foresight diffusion and adoption it is already mentioned that the first Danish foresight exercises were very much inspired by the British and German Delphi-oriented foresight programmes. Another diffusion element has been a number of Nordic joint foresight exercises and a network among foresight practitioners and foresight academics. Half of the above mentioned Danish foresight projects had active involvement from one particular academic group (formerly at Risø National Laboratory) and the same group participated in European and Nordic foresight projects and network activities.

Even though Denmark was not among the first countries to adopt foresight explicitly, it must be noted, that Denmark during several decades has carried out foresight-like processes and strategic planning within individual sectors. For example, the various energy action plans have many similarities to foresight, both with regard to the processes and results. Another example is the widespread use of futures workshops and citizens panels in municipal and regional planning. In the latter case focus are set on the inclusion of and the interaction with the wider public and not on expertise type of foresight methods.
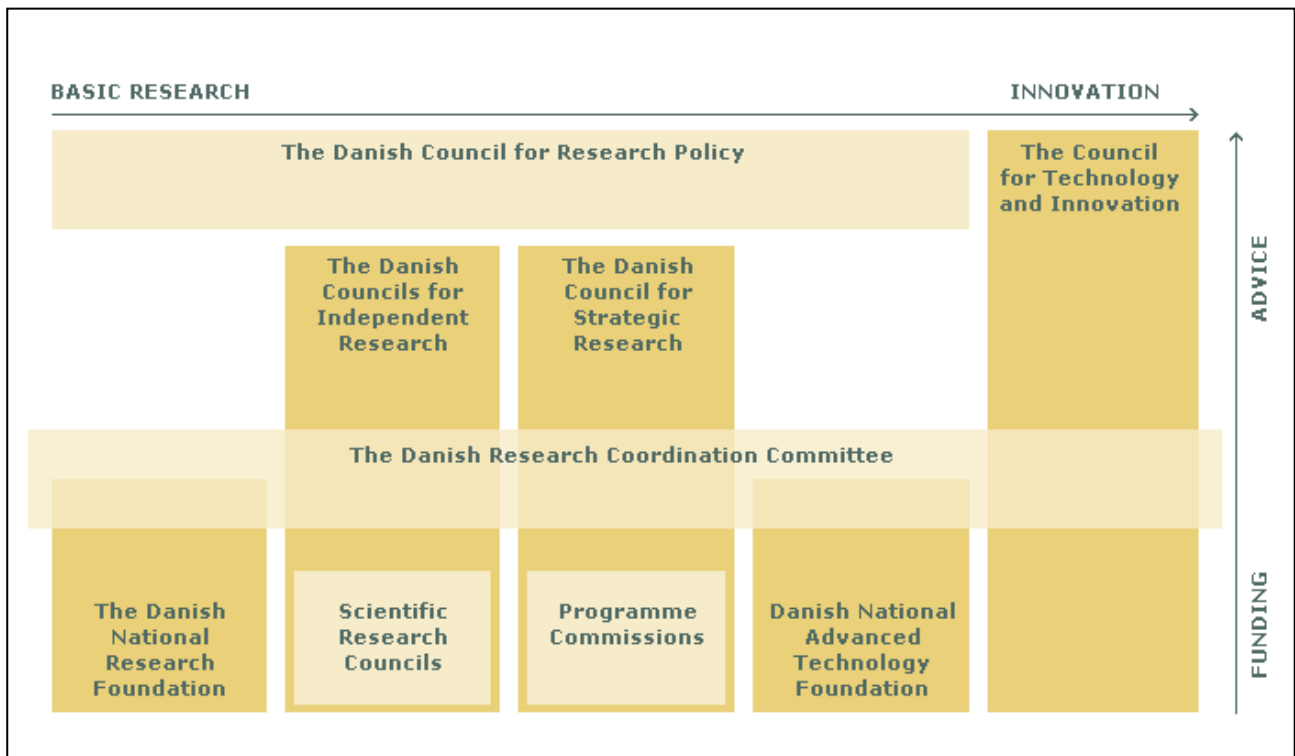
The Danish R&D funding system

As the aim of the Research2015 project was affiliated with shaping and defining an agenda for strategic research, it is useful to summarize the recent changes and present key features of the Danish R&D funding system.

From 2000 to 2006 the public funding for research was in the order of 0.70 % to 0.75 % of GDP. One of the major initiatives of the Globalisation Strategy was to increase the public funding for research to 1% of GDP by 2010. That goal was achieved. The total Danish Governmental Expenditure on research and development was DKK 17.2 bn in 2010 corresponding to 1.001 percent of GDP. In 2010 approximately the half of this was government appropriations directly to the universities. As the increased R&D budgets mostly have been allocated to the competitive part of the science funding, the direct appropriations to universities have decreased from approximately two thirds in 2005.

Another major initiative of the Globalization Strategy was in increase the percentage of public research funding that is should be subject to competition. In 2005 two third of the Danish public research funding was direct appropriations to universities and research centres and the goal was to increase the competitive part from one third in 2005 to the half in 2010. That goal was achieved by increasing the competitive part much more than the direct appropriations during the period. Especially funding is made available for strategic research.

The largest part of governmental research expenditures are handled by the Ministry for Science, Technology and Innovation. Besides this are much smaller parts are funded by other ministries (such as the Energy Research and Demonstration programme within the Danish Energy Agency) and by the research programmes of the regions. The latter is primarily affiliated to the health sector as the hospitals are run by the region.

Figur 2. Danish advisory and funding system for science and innovation. Source: Danish Agency for Science, Technology and Innovation.

In 2003 the Danish advisory and funding system for science and innovation was reorganised. The most significant change was the creation of a council for strategic research. The main advisory council is the Danish Council for Research Policy. The Council advises the Minister for Science, Technology and Innovation on matters concerning research policy. The funding part of the Danish research and innovations advisory system is divided five main bodies and the activities of these five entities are coordinated by the Danish Research Coordination Committee.

The Danish National Research Foundation is set up as independent foundation by the Government in 1991. The Foundation primarily funds so-called Centres of Excellence for longer periods of time. Centres are typically each funded with a total DKK 50 to 100 million over six to 10 years.

The Council for Independent Research funds specific research activities based on the researchers' own initiatives. The Council also provides scientific advice in all scientific areas for the Danish Minister for Science, Technology and Innovation, the Danish Parliament and the Danish Government. The council is quite traditionally organized with five scientific research councils covering Humanities, Natural Sciences, Social Sciences, Medical Sciences, and Technology and Production Sciences.

The Council for Strategic Research gives advice on research and technical subjects to applicants and others within its scope of activities. The Council has an obligation to contribute to an increased co-operation between public and private research. The Strategic Research Council funding function is through a number of programme committees. As of 2010 the following programme committees existed: Education and Creativity; Strategic Growth Technologies; Individuals, Disease and Society; Transport and Infrastructure; Health, Food and Welfare; Sustainable Energy and Environment.

The High Technology Foundation is an independent foundation established by the Government in 2005, and it supports research and innovation. The general objective of the Foundation is to enhance growth and strengthen employment by supporting strategic and advanced technological priorities within the fields of research and innovation.

Finally, the Council for Technology and Innovation has both an advisory and a funding role. The Council administrates a number of funding mechanisms initiated by the Ministry for Science, Technology and Innovation concerning collaboration and diffusion of knowledge, entrepreneurship and commercialisation, regional development, and support for international collaboration about deployment of knowledge and technology.

Body	Budget in 2009	Budget in 2010
Danish National Research Foundation	275	400
Council for Independent Research	1291	1366
Council for Strategic Research	969	1176
The High Technology Foundation	272	509
Council for Technology and Innovation	900	1050

Tabel 2. Budgets for the councils under the Ministry for Science, Technology and Innovation. In millions DKK. Source: Ministry for Science, Technology and Innovation.

A couple of other reforms of the Danish governmental science and innovation system should also be mentioned as important background information.

In 2003 the governing system of Danish universities were reformed. One element of this reform was the each university and research centre got a governing board with a majority of external members and with the overall responsibility of governing the universities including appointing the rectors. Furthermore, following the reform directors and managers at all level of within the universities was appointed (in opposition to elected).

A third significant reform was a merger process between Danish universities and research centres with effect from 2007. The reform reduced the number of institutions (universities and research centres) from 25 to 11. As a result three large universities emerged (University of Copenhagen, University of Aarhus and Technical University of Denmark). Combined the three universities has 69% of the turnover and the staff of the public sector research in Denmark[4]. Four medium size universities (University of Southern Denmark, Aalborg University, Roskilde University and Copenhagen Business School) accounts of approximately 25% of the turnover and staff. One very small university and four research centres constitutes the remainder.

4 The Research2015 project

This section described briefly the Research2015 project. As an introduction to this process the section also briefly describes the Danish government's Globalisation strategy that gave the political impetus to the Research2015 project.

Grand Challenges and the government's Globalization Strategy

In the spring of 2005, the Danish Government launched a process that should meet the Grand Challenge of increasing globalisation. The aim was meet this challenge by developing a vision and a strategy to develop Denmark to a leading growth, knowledge and entrepreneurial society. The work was set up in the wake of the Government program "New Goals", as the re-elected centre-right led Government presented after the general election in February 2005.

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[4] Based on figures from 2005 before the mergers. Source: VTU, 2006.

The Government set up an internal Committee of Ministers and a broad-based Council for Globalisation, which was aimed to advise the Committee Ministers on this strategy. The Globalization Council consisted of 26 members with leading figures from business, labour market organizations, universities and the Government. The Prime Minister was Chairman of both the Committee of Ministers and the Globalization and the Minister on Economics and Business Affairs served as Vice-Chairman. The latter also held the position as Vice-Prime Minister in the two-party coalition Government. In addition, the Minister of Finance and the Minister for Science, Technology and Innovation participated.

From April 2005 to April 2006 the Globalization Council held 15 meetings. The meetings were typically two-days of meetings from lunch to lunch. The first meeting was a kick-off meeting and the following three meetings discussed the Grand Challenges that Denmark faces. These meetings were partly initiated by some background papers prepared by the secretariat of the Globalization Council. The two last meetings included the overall strategy and the presentation thereof. The intermediate meetings discussed nine different themes were discussed.

For each meeting and each theme were prepared a discussion paper with the Government's overall objectives for the region as well as the main data and prerequisitions. Also a number of background notes and fact sheets were distributed among the council members. The background notes were prepared by senior staff in relevant ministries. On the first day of the meetings, there were invited a number of Danish and international presenters either in their personal capacity as experts within the individual theme or as representatives of relevant non-governmental organizations. Relevant Ministers also participated. There were typically 40-50 persons at these meetings. Agendas, attendee lists, and background notes were posted on the website www.globalisering.dk and after each meeting a press conference was held by the Prime Minister and the Minister of Economics and Business Affairs Minister (chairman and vice-chairman of the Globalization Council). In the light of Globalization the Council's work, the Government in April 2006 presented an overall strategy for Denmark in the global economy: ""Progress, Innovation and Cohesion Strategy for Denmark in the Global Economy" (the Government, 2006). The Globalization Strategy had 14 so-called focus areas (The Danish Government, 2006):
1. World top performing primary and lower secondary school
1. system
2. All young people should complete a general or vocational upper secondary education programme
3. A coherent education system and professional guidance
4. At least 50 per cent of young people should complete a higher education programme
5. Education and training programmes with a global perspective
6. World top level short-cycle and medium-cycle higher education programmes
7. World top level universities
8. More competition and better quality in public sector research
9. Good framework conditions for companies' research, development and innovation
10. Stronger competition and greater openness and transparency to strengthen innovation
11. Strong interaction with other countries and cultures
12. More high-growth start-ups
13. Everyone should engage in lifelong learning
14. Partnerships to promote the implementation of the Globalisation Strategy

The each of the focus area the Globalization Strategy defined a two to four strategic objectives and number of initiatives to promote the – typically 8 to 10. The suggested initiatives were subsequently translated into political initiatives and legislation.

The Globalisation Strategy were supported by the two parties of the government (the liberal party and the conservative party), the Government's parliamentary support party (the Danish People's

Party) as well as two leading opposition parties (the Social Democrats and the Social-Liberal party).

Of interest for the following section, is the Globalisation strategy's key initiatives and targets for public sector R&D –corresponding to item 8 of the above mentioned focus areas. The Globalisation Strategy put up 10 such key initiatives and targets for public sector R&D:
1. More funds for public sector research - 1% of GNP in 2010
2. 50% of research funds should be subject to competition
3. New models for competition between universities
4. Research grants should cover all costs
5. Greater number of large, long-term grants
6. Research grant pool for research infrastructure
7. More funding toward strategic research
8. Better basis for prioritising
9. Quality barometer and evaluation of large-scale programmes
10. Co-financing of Danish participation in international research co-operation

The Globalisation Strategy process was never officially associated with foresight or Future-oriented Technology Analyses of a grand challenge. Nevertheless, the process contained several methodological elements associated with foresight. The process included expertise oriented elements (expert panels, expert discussion papers), evidence oriented elements (indicators and fact reports) as well as interaction oriented elements (conferences, workshops, stakeholder inclusion).
The Globalisation process fulfils most of Calof and Smith's key success factors. 1) Focus was set on a clearly defined client: the government and in particular the absolute top of the government. 2) There existed a clear link between the process and the political agenda: even so much that the process might be perceived as a legitimization and fine-tuning of already settled solutions to challenges identified by the government's top. 3) There was a very direct link to senior policy-makers in the sense that the prime minister headed the process and headed all major meetings. Furthermore key ministers was attached the process when needed. 4) A strong public-private partnership was secured by inclusion of leading figures from business and labour market organizations in the Globalisation Council. 5) The process might not fulfil the factor of the development and employment of methodologies and skills not earlier used in other departments. The process drew on existing methodologies and skills but the scale of the process and the linkages to the top-executive layer of the Government could not be matched by any other department that the prime minister's office. 6) The process had a very clear and extensive communication strategy with focus on very wide communication through press conferences and media coverage in newspapers and television. 7) Almost all key stakeholders were included in the process. 8) Only for the last factor the process did not meet the key success factors. No initiative was taken to take advance of, or create, a national academic receptor and training capacity.

Research2015

One of the suggested initiatives in the Globalization strategy concerned was the initiative "better basis for prioritizing", which was aimed to strengthen the basis for the political priorities of the funding for strategic research. The initiative should consist of identification of research needs that societal and business developments create and the capability of the Danish research institutions placed to meet these needs. The identification should be based on consultations, dialogue processes with e.g. ministries, institutions and non-governmental organisations. Every four years such a process should result in a catalogue of important themes for strategic research. The catalogue should constitute a basis for priority-setting, and it could constitute a common reference framework for the Danish Parliament's political negotiations on the allocation of resources for the strategic research. This was the background for the Research2015 process that was initiated by a passage in the Parliament in November 2006 as a part of the national budget negotiations for 2007. The

result of Research2015, the catalogue, was presented in May 2008. The task was placed in the Danish Agency for Science Technology and Innovation (DASTI).

Phases of the Research2015 process

The Research2015-process included four phases. The first phase included a broad mapping of the strategic research needs. This mapping was conducted from March to October 2007. The mapping contained three parts. On behalf of DASTI OECD's International Futures Programme Unit carried out an international horizon scanning leading to 125 important trends and grand challenges. The report comprised approximately one page of text for each international trend or challenge and its relevance for Denmark (DASTI, 2007a). Another part was a public internet-based hearing among all interested parties. This resulted in 432 proposals for themes from individual citizens, universities, non-governmental organisations, public committees and councils, as well as private companies. Furthermore, ministries contributed with 90 proposals (DASTI, 2007b). The evaluation found that 64% of all proposals came from the public research and education sector, and only very few (less than 10%) proposals came from citizens without any affiliation to this sector or to other major interests groupings (Teknologisk Institut, 2009, p35-36).

The second phase included an analysis of the received material from phase 1. The material was analysed by an independent expert panel with eight members with the aim of identify coherent research themes from the received material. The members of the expert panel were appointed by the Strategic Research Council based on nominations from Ministries, industry and interest groupings. Initially there were defined a three criteria or definitions of the themes. They should be challenging or opportunity-oriented, be wide enough to ensure effective competition between the Danish research environments in the call for proposals for strategic research funding, and finally research must play a central role in the solution of challenge of the theme or research should be useful in other ways. The expert panel got relatively free hands to carry out the clustering of the themes, but it was stressed that in their work should reflect the main thrust of – and refer back to – the original material. The evaluation of the process revealed that the material of the OECD horizon scanning was only used in a very limited degree. The scanning more served as background information or as a kind of check list (Teknologisk Institut, 2009, p41). The expert panel structured the material into 42 proposals for strategic research themes. The 42 proposals were exposed to a user panel consisting

Final priorities in the Research2015 catalogue
Energy, climate and the environment
• Energy systems of the future
• Future climate and climate adaption
• Competitive environment technologies
Production and technology
• Bio resources, food and bio products
• Intelligent solutions for society
• Production systems of the future
• Strategic growth technologies
Health and prevention
• From basic research to individualised treatment
• Chronic disease between prevention and rehabilitation
• Human health and safety in the interaction with environment factors
• Healthy lifestyle – what creates change?
Innovation and competitiveness
• Denmark's competitiveness
• Innovation
• The public sector of the future
Knowledge and education
• Education, learning and competence development
• What works? Evidence in practice
• Knowledge production and dissemination of knowledge in society
People and societal design
• Sustainable transport and infrastructure
• Better life-space – space for life and growth
• Cultural understanding in a globalised world
• Changing lives
Source: VTU, 2008.

of some 50 persons from businesses, public authorities and non-governmental organisations designated on the basis of their personal competences – but probably also reflecting major stake-

holder groupings in the Danish society. The user panel met for a workshop in order to refine the proposals. The user panel revised and reduced the 42 proposals to 31 proposals for future strategic research themes.

The third phase included the completion of the final catalogue. The phase consisted of dialogue meetings between the expert panel and the Strategic Research Council, the Council for Independent Research, individual Ministries, as well as with industry and non-governmental organisations. In this phase the themes were reduced to 21.

The fourth phase included the implementation of the results as political priorities of strategic research. This came in the form that the political negotiations in the context of the budget bill for 2009, 2010 and 2011. The result was that very close to all the resources for strategic research has been prioritized for around half of the 21 proposals in the context of the political negotiations. Thus, the catalogue has constituted the basis for prioritisation for the following three years. However, also other factors, particularly the Parliament's energy agreement, have contributed significantly to the prioritisation process. The key actors in this phase were the five negotiators from each of the five parties behind the Globalisation Strategy.

Measured as impact on the national budget the Research2015 process was quite successful. The catalogue formed, together with other political factors, a basis for these negotiations. During the budget negotiation in 2008 approximately DKK 1 bn was allocated to strategic research in 2009 and 2010. See table 3. Indeed sustainability aspects were taken into account in the priorities in the sense that research within themes such as energy, environment, climate, climate adaption and sustainable transport & infrastructure accounted for 76% of the implemented priorities.

Compared to the annual budget of the strategic research council of 1.2 bn DKK the Research2015 accounts for approximately half of the priorities of council. The rest have been priorities by the parliament through usual political negotiations without any foundation. Compared to the total competitive part of the Danish governmental R&D expenditures of approximately DKK 8 to 9 bn annually the Research2015 only affects a very small part; in the order of 5 to 6 %.

Tabel 3. Implementation in the national budget for strategic research. Source: Teknologisk Institut, 2009.

Theme	Budgets in million DKK	
	2009	2010
Energy, climate and environment		
• Energy systems of the future	190	455
• Future climate and climate adaptation	43	0
• Climate research center in Greenland	20	15
• Competitive environmental technologies	10	0
Production and technology		
• Bio-resources, food and other bio products	45	50
• Intelligent solutions for society	0	10
Health and prevention		
• From basic research to individualized treatment	30	20
• Human health and safety in interaction with env. factors	0	19
Innovation and competitiveness		
• The public sector of the future	0	15
Knowledge and education		
• What works? – Evidence in practice	20	0
People and societal design		
• Sustainable transport and infrastructure	25	0

An overview of the whole process is presented in table 4.

Tabel 4. Overview of the Research2015 process. Source: Teknologisk Institut, 2009.

Phase	Process	Results	Involvement
1: Mapping	OECD horizontal scanning Public hearing among all interested citizens Input from ministries	125 trends and challenges 432 suggestions 90 suggestions	In principle everybody interested in strategic research
2: Identification of themes	Expert group analysed the material from phase 1 Workshop with user panel about the 42 themes Expert group revised the 42 themes	42 themes for strategic research Ideas and input for the further process Reduction to 31 themes for strategic research	Expert group (8 persons) User panel (53 persons)
3: Final proposal	Dialog with stakeholder organisations, ministries and research councils	Reduction to 21 themes for strategic research	Strategic research council (14) Independent research council (18) Contacts in ministries (15) Industry and interest groupings (23) Chairman of Danish universities association (1)
4 : Implementation of the Research2015 catalogue in real policy	Political negotiations in Parliament on the Fiscal Act 2009 and on	Most (>75%) of the 21 themes for strategic research were receiving budgets	Speakers from the parties in Parliament behind the budget (5)

Concerning Foresight methods the Research2015 process included elements such as horizon scanning, expert panels, user panels, dialogue meetings, conferences and workshops.

The evaluation of the Research2015 process may be considered as a fifth phase. The evaluation had focus on both the process and the result of the process (Teknologisk Institut, 2009).The general conclusion was that the Research2015 was successful. The process constitutes has fulfilled its two major objectives as forming an improved basis for prioritisation of the strategic research, and that it actually was used as in the political priorities of the strategic research. It might be unique in an international context that Research2015's effect on the fiscal act can be verified. What is not clear is how the political priorities of strategic research would have appeared without the Research2015 process. The significant emphasis on energy and environmental issues would probably have been the same.

Also the Research2015 project fulfils seven of Calof and Smith's eight key success factors. 1) Focus was set on a clearly defined client: the (majority of the) Parliament. 2) There existed a clear link between the process and the political agenda: Priority setting of strategic research was put on

the political agenda by the government through the Globalisation Strategy and the political negotiations for the fiscal act for 2009 constituted a forum for this agenda. 3) There was a very direct link to senior policy-makers in both other ministries and in research councils. 4) A strong public-private partnership was secured through the use panel and following hearings. 5) The development and employment of the Research2015 process for systematic priority setting of strategic research has not earlier been used in Denmark. As mentioned earlier, similar systematic processes have been used in energy policy and in the physical planning in municipalities and regions but not in affiliation with science policy. 6) The process had a clear and simple communication strategy targeting the political parties and to different stakeholder groupings. In the evaluation between 60% and 80% of responders from ministries, stakeholder organisations and the strategic research council declared that they agreed or mostly agreed in that the aim of the Rearch2015 was clearly communicated (Teknologisk Institut, 2009, p33). On the contrary 66% of the responders from the independent research council declared that they disagreed or mostly disagreed in that the commucation was clear. 7) Almost all key stakeholders were included in the process. 8) Also in this case no initiative was taken to take advance of, or create, a national academic receptor and training capacity.

5 Conclusion and discussion

The paper has applied an alternative framework for analysing national and cultural differences in foresight activities. As the development of such a framework is outside the main aim of the paper no further analyses and verifications have been made on this. However, it seems obvious the suggested framework could form a basis for further studies.

The key aim of the paper concerns grand challenges and priority setting. As mentioned in the introduction Denmark is facing Grand Societal Challenges similar to other countries and also a few challenges that are unique for this country.

In effect the Globalisation Strategy and the Research2015 are aiming to shape and drive structural and system transformations to prepare the country to meet some of these challenges. The Globalisation Strategy aimed to meet the grand challenge of globalisation by preparing a vision and a strategy to develop Denmark to a leading growth, knowledge and entrepreneurial society. As such the Globalisation Strategy did not analyse or discuss which grand challenges were the most significant for Denmark; this was decided by the government. The Research2015 process did not intent to meet any particular grand challenge apart from being a result of the Globalisation Strategy. But ultimately the resulting priorities for strategic research were aiming significant grand challenges such as energy supply, environmental challenges, health, innovation and competitiveness, etc.

Neither the Research2015 nor the Globalisation Strategy was by their key responsible organisations recognised as foresight or as having used FTA methods. Nevertheless, the process of the Globalisation Council included both expertise oriented FTA elements (expert panels, expert discussion papers), evidence oriented FTA elements (indicators and fact reports) as well as interaction oriented FTA elements (conferences, workshops, stakeholder inclusion). The Research2015 process included FTA elements such as horizon scanning, expert panels, user panels, dialogue meetings, conferences and workshops.

Both processes are in general considered successful in the sense that they produced results that have had verifiable impact on policy making and governmental budget allocations. Both processes fulfil most of the key factors for successful government-led foresight projects.

But the two processes also show some traits distinct for a country with a low power distance and weak uncertainty avoidance.

The two processes did include formal and authoritative analyses and fast sheets (such as the OECD horizontal scanning or the fact sheets in the Globalisation Council), but the most important methodological element were workshops, hearings and stakeholder inclusion. This reflects low power distance societies need for subordinate consultation. As concluded by Togeby et al. (2003) political negotiations rather than analytical presentations are the main basis for political decisions in Denmark. In a Danish context a good decision is a decision all (or at least the majority) agree about. Scientific and analytical contributions merely act as legitimization. This also relates to the country's low uncertainty avoidance. During the expert group's work with reducing the number of themes for strategic research, a lot of uncertainty might have appear concerning the importance of each theme. Furthermore, new and deviating ideas were introduced during the process and some of these were included in the final catalogue. On the other hand the general knowledge level within societal actor groupings (e.g. labour market organisations) is relatively high in Denmark and that might contribute to avoiding dysfunctional policies.

Considering the society's weak uncertainty avoidance it might come as a surprise that relative long-term planning such as the Globalisation Strategy was initiated and implemented. There might be two reasons for this. First, the political constellation during the preparation of the Globalisations strategy was quite unusual. Three political parties constituted a robust majority in the parliament making the need for cumbersome negotiations less. Second, even though the key challenges were decided by the government, there was a wide tolerance for deviant ideas for solution.

The conclusion might be, that foresight activities in Denmark more is a vehicle for negotiations between major societal stakeholder than it is a systematic analysis of grand challenges and the devising of clearly argued solutions.

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