



Ministry of Science
Technology and Innovation

SYNOPSIS OF

RESEARCH2015

A BASIS FOR PRIORITISATION
OF STRATEGIC RESEARCH

Synopsis of "RESEARCH2015 – A basis for prioritisation of strategic research"

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Preface

With the agreement on the implementation of the globalisation pool from November 2006, a broad parliamentary majority took steps to make Denmark a leading knowledge society. The agreement strengthens both independent and strategic research.

As part of the agreement about the globalisation pool, the parties to the agreement decided that the future foundation for identifying and prioritising focus areas for strategic research should be improved, and that every fourth year a catalogue of important themes for future strategic research should be submitted to the Folketing (Danish Parliament).

This is the first time such a catalogue has been drawn up. This publication summarises the 21 proposals for strategic research themes in the catalogue aimed at challenges where Danish

research and new knowledge can make an important contribution to the realisation of the desired societal objectives.

I should like to emphasise that this catalogue does not express the priorities of the Government or the other parties to the agreement. Rather, the catalogue is the result of an extensive process of mapping, analysis and dialogue undertaken by the Danish Agency for Science, Technology and Innovation.

It is my hope that everyone interested in research will find that this catalogue creates a sound, progressive foundation for prioritising funds for strategic research, and that the catalogue can be a source of inspiration for the work of prioritising research funds at universities, government research institutes, hospitals etc.

Finally, I would like to thank the several hundred engaged persons from universities, research councils, public institutions, companies, ministries and interest groups and the general public who have actively contributed during the past year to the creation and refining of this catalogue.

Yours sincerely



Helge Sander
Minister for Science, Technology and Innovation





Introduction

This booklet is a synopsis of the publication entitled "RESEARCH2015 – A basis for prioritisation of strategic research", which contains 21 proposals for strategic research themes divided into 6 overall areas.

As part of the agreement to implement the 2006 globalisation pool, the parties to the agreement (Denmark's Liberal Party, the Conservative People's Party, the Social Democratic Party, the Danish People's Party and the Social-Liberal Party), decided that the foundation for the political prioritisation of the funds for strategic research should be improved. This is the background and purpose of "RESEARCH2015 – A basis for prioritisation of strategic research".

The point of departure of the proposals catalogue is a broad-based mapping of the strategic research needs created by societal and business development. The mapping, which was carried out between March and October 2007, resulted in more than 300 contributions to strategic research themes from the general public, organisations, universities, companies and researchers. From November 2007 to March 2008, the many contributions formed the basis for an extensive process of analysis and dialogue, which has resulted in the final catalogue of proposals.

Further information, including the proposals catalogue, the mapping material, reports etc. can be found at www.FORSK2015.dk



Energy, climate and environment

Energy systems of the future

Future climate and climate adaptation

Competitive environmental technologies

Energy systems of the future

Modern societies are completely dependent on stable energy supplies, and energy systems are the lifeblood of every modern economy. Global challenges in the field of energy in the coming decades are, however, great and energy is expected to be an important global theme in the 21st century. Forecasts up to 2050 indicate rising energy consumption, stagnating – and then declining – oil production and growing climate change.

A strategic research effort is to contribute to the development of competitive, energy efficient and sustainable energy systems that can satisfy the growing energy demand and limit the negative environmental impacts connected with energy production and consumption. The effort is, moreover, to underpin the opportunities of the business sector to exploit the great future market potentials in the area.



Future climate and climate adaptation

Human activities contribute to creating changes in the global climate. There are, however, great uncertainties connected with the scope and speed of climate change, just as uncertainty exists concerning regional fluctuations and consequences and about how to effectively meet the climate challenge. Changes in the climate influence, for example, ecosystems and biodiversity, coastlines, the marine environment, health, water and wastewater systems, and infrastructure.

A strategic research effort is to reduce the uncertainties concerning climate change and its effects and to support future climate policy decisions about how to counteract – and adapt to – a changeable climate. The effort is simultaneously to create the foundation for the development of innovative societal and commercial solutions. There is a need to strengthen coordination between the research environments and develop research capacity in the area.

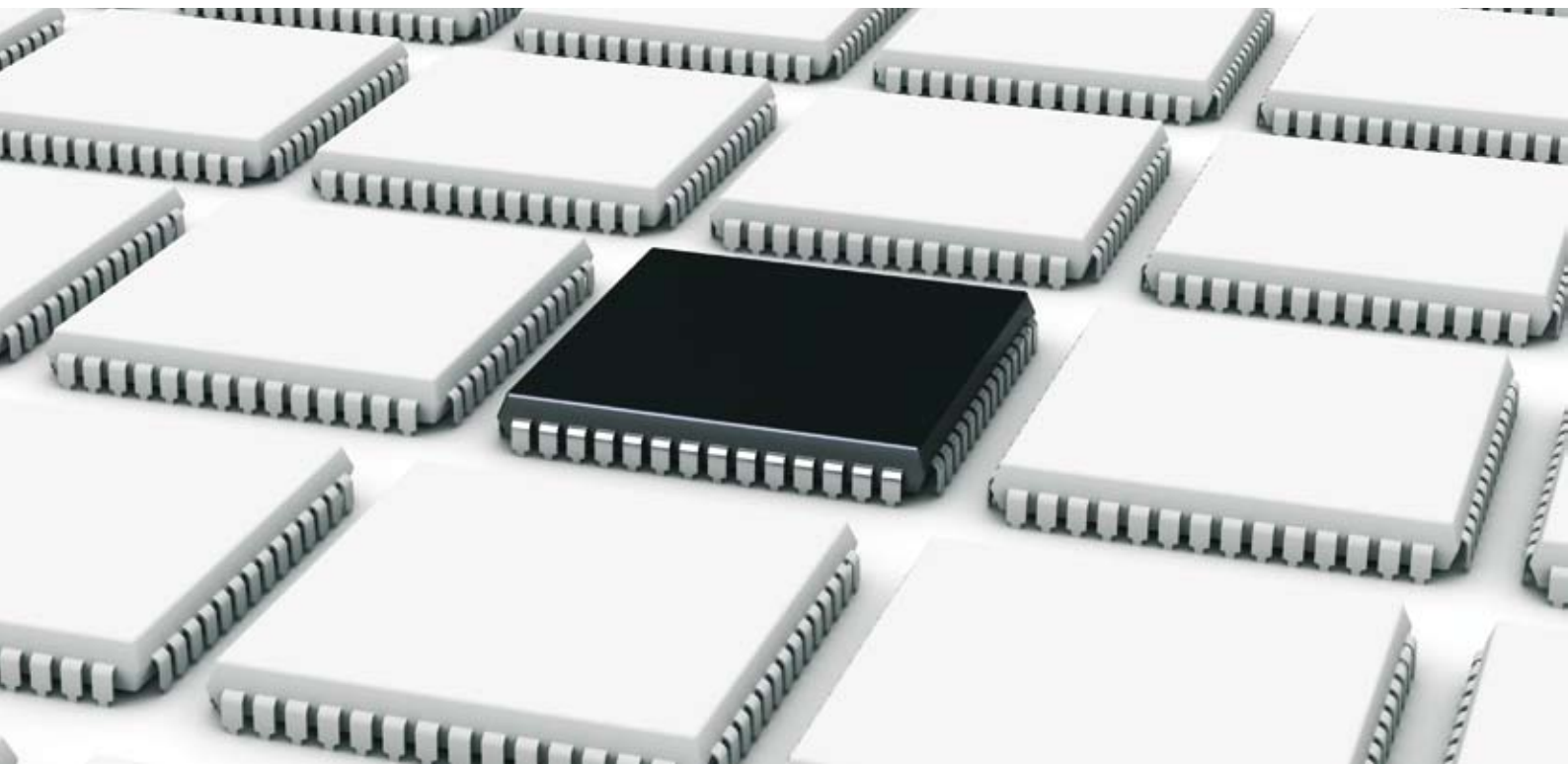


Competitive environmental technologies

The pressure on the environment is growing in large parts of the world in step with economic development and the resulting rise in consumption and production. At the same time, the focus is increased on the importance of a clean environment in many parts of the world. This means that the global market for environmental technologies in areas such as transport, energy, food production, water supply, waste, and wastewater and soil purification is expected to have some of the highest growth rates in the coming decades.

A strategic research effort is to develop globally competitive environmental technologies that make it possible to raise the standard of living without damaging nature and human beings. The effort is to contribute to creating a cleaner environment inside and outside of Denmark, to limited natural resources being used in a more careful way, and to underpinning the export and growth potential of the business sector.





Production and technology

Bioresources, food and other biological products

Intelligent solutions for society

The production systems of the future

Strategic growth technologies

Bioresources, food and other biological products



The production of food and other biological products is of great significance for both society and nature and simultaneously constitutes the basis of considerable Danish production and export. Biological production today is facing a number of challenges and opportunities that follow on the rising global demand for food and bioenergy as well as new consumer demands in the fields of ecology, health, safety and ethics.

A strategic research effort is to support competitive biological production that promotes health and a clean environment. The effort is, moreover, to develop new possibilities within, for example, ecology, aquaculture or vegetable and animal products that satisfy consumers' and society's demands or can be utilised in the production of medicine, biofuels etc.

Intelligent solutions for society

About one third of the rise in Danish work productivity in recent years is due to increased investment in – and utilisation of – information and communication technology (ICT). In many areas of society there are also great perspectives in developing new ICT-based solutions. This is the case in, for example, health, education, energy and traffic, which are areas faced with large-scale development challenges in the years to come.

By means of development and systems integration in close cooperation with ICT researchers, specialists and users, a strategic research effort is to create intelligent solutions within important areas of society. The effort can both increase the quality of and release resources in public production. Building up ICT research capacity should be incorporated in the effort.



The production systems of the future

In 2006 goods export comprised over 60 per cent of all Danish exports and the production of physical products is – and will continue be – very important for the Danish economy. Danish society is extremely ambitious in the environmental area and the level of costs in this regard is relatively high. Therefore, there is a need to develop production systems that are superior from the point of view of productivity, the environment as well as quality.

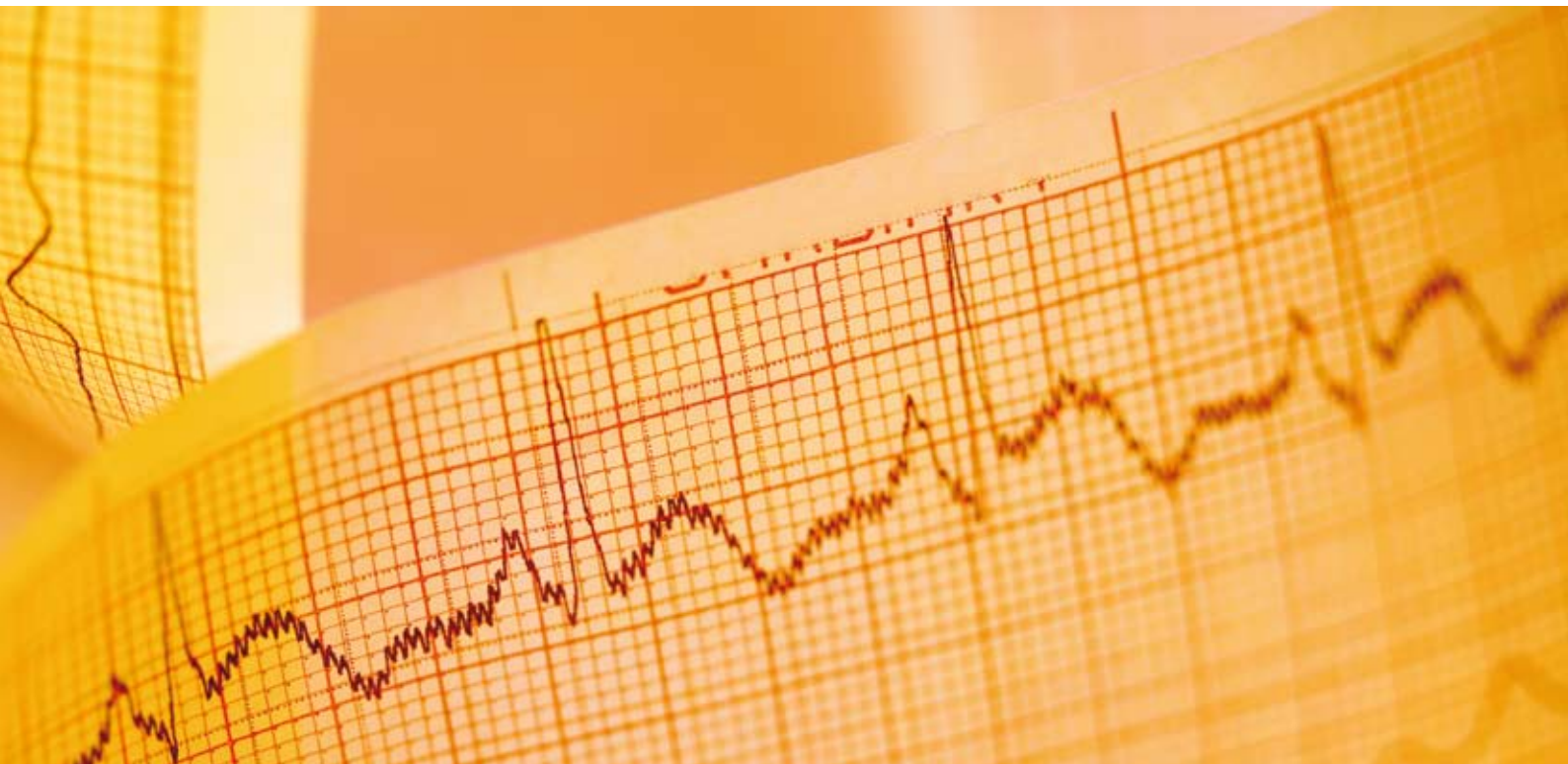
A strategic research effort is to develop the environmentally friendly, efficient production systems of the future with a focus on new technical equipment and its integration with the companies' organisation and management systems. The effort is, moreover, to contribute to the reduction of energy consumption, the volume of waste and environmental impacts from the business sector, as well as to better health and working environment.



Strategic growth technologies

Knowledge intensive products and processes are a central element in Danish trade and industry and constitute an important basis of growth and prosperity. Strategic growth technologies – such as nanotechnology – are very important for the competitiveness and growth potential of many companies and is simultaneously decisive for the development of new and better solutions within areas such as energy, environment and health.

A targeted research effort in the field of strategic growth technologies is, in particular, to support the needs of trade and industry for advanced technological knowledge, but it should also contribute to creating the foundation for the development of technological solutions to a number of societal challenges.



Health and prevention

From basic research to individualised treatment

Chronic disease between prevention and rehabilitation

Human health and safety in interaction with environmental factors

Healthy lifestyle – what creates change?

From basic research to individualised treatment

Diseases are often due to impacts that occurred many years before the disease is diagnosed. In some cases, the seeds of the disease are sown already at the embryonic stage, while the development of other diseases depends on factors occurring later in life. The mapping of the human genome enhances the understanding of the interaction between heredity and environment, opening up the possibility of tailoring a course of treatment to the individual patient.

A strategic research effort is to make it possible to proceed from basic research and understanding of disease to better, more individualised treatments. The goal is better prevention, diagnosis and completely new treatment regimes that are more effective and involve fewer side effects. The effort is to ensure a critical mass and strong coordination and to underpin the competitiveness of the business sector.



Chronic disease between prevention and rehabilitation

The great, widespread chronic diseases constitute a long-term health challenge. Approximately one third of the Danish population – 1.5 million people – live with one or more chronic diseases, and this figure is set to rise in step with the numbers of elderly citizens. About 80 per cent of total health costs today are for treating diseases that could be described as chronic. Longer lifetimes mean that more people will contract chronic diseases such as cancer, osteoporosis, diabetes, cardiovascular diseases and Alzheimer's disease.

A strategic research effort is to contribute to developing patient-centred medicinal, technological and organisational solutions to chronic disease – in relation to prevention, treatment and rehabilitation. By these means research is to contribute to preserving the quality of life and functionality of people with chronic diseases as well as potentially reducing health expenditures.



Human health and safety in interaction with environmental factors

Human health and safety are influenced by a large number of environmental factors – chemical, physical and microbiological. A number of these can be harmful to health while others promote health and are necessary. It is a challenge to reduce human exposure to harmful environmental factors from, for example, soil, air and water pollution, through foods or chemical substances from, for instance, industrial products.

A strategic research effort is to reduce the harmful impacts on human beings by means of enhancing knowledge about environmental factors and developing new methods for risk assessment and prioritisation of the effort. The research is, moreover, to strengthen the basis for the development of new, environmentally friendly solution models, technologies, systems and products in the business sector, thus providing Danish companies with a head start in competition on the global markets where safety and health are increasingly in focus.



Healthy lifestyle – what creates change?

Many people lead unhealthy lives. The wrong diet, smoking, alcohol and too little or no exercise result in the increased occurrence of lifestyle diseases and impair the quality of life. Unhealthy lifestyle is responsible for 40 to 50 per cent of all disease and premature death in Denmark today. At the global level, unhealthy lifestyle is anticipated to be the cause of 70 per cent of all disease and premature death in 2020.

A strategic research effort is to contribute to the creation of long-term changes in the behaviour of children, young people and the elderly, and – through the development of measures that promote a healthy lifestyle – reduce the occurrence of lifestyle and chronic diseases, thereby ensuring that that more people enjoy more good years of life. The long-term perspective connected with lifestyle research and behavioural change should be taken into consideration in an effort in the area.





Innovation and competitiveness

Denmark's competitiveness

Innovation

The public sector of the future

Denmark's competitiveness

Foreign trade comprises approximately 40 per cent of Danish GDP at present, and about one in four Danish jobs have been created through export. In spite of a high level of costs, Denmark is one of the wealthiest and most competitive countries in the world. But what is it that makes the Danish economy competitive, and how can the ability to compete, which is the foundation of both prosperity and welfare, be future proofed?

A targeted strategic research effort in the prerequisites, framework conditions and opportunities of importance for competitiveness is to strengthen the basis for the organisation of educational efforts, corporate strategies, business legislation etc. in order to future proof Danish competitiveness and balance it appropriately in relation to other societal considerations.

Top 10 - The world's most competitive countries 2007-2008

USA	1
Switzerland	2
Denmark	3
Sweden	4
Germany	5
Finland	6
Singapore	7
Japan	8
United Kingdom	9
The Netherlands	10

Source: World Economic Forum:
The Global Competitiveness Report 2007-2008

Innovation

The market lifetime of products and services is continually shorter. This is a development that makes growing demands on companies to constantly improve their innovative skills and emphasises knowledge and creativity as important parameters of competition. The Danish economy is sound in many ways, but if Denmark is to continue to be in a strong position in global competition in the future, the ability to innovate is a key challenge.

A strategic research effort is to provide an improved knowledge base for corporate leaders, employees and politicians concerning the best possible manner in which innovation processes are led, organised and promoted. The aim is to take Denmark up among the most innovative countries in the world.



The public sector of the future

The Danish public sector is efficient and well run, but it is facing great challenges and development demands. The expectations of the general public concerning demand oriented public service are rising along with the pressure of expenditure. Successful development of the public sector is of decisive importance for the quality of welfare in the future, but it also is of wider value for society and the business sector.

A strategic research effort is to contribute to developing an innovative, fresh thinking public sector with the capacity to adapt to the challenges of the future. The perspectives are better quality and efficiency in public services and efforts in a great number of fields such as the social, health and education area, the police, the defence, public administration etc.





Knowledge and education

Education, learning and competence development

What works? – Evidence in practice

Knowledge production and dissemination of knowledge in society

Education, learning and competence development

Education, learning and competence development contribute to the long-term development, cohesion and prosperity of society. Education is likewise a prerequisite for the individual's personal opportunities and active participation in society.

A strategic research effort is to contribute to raising the level of education and competence in the Danish population, to improving the quality of education programmes, to most possible people receiving a qualifying education, and to Danes' competences developing in step with the challenges that arise in a globalised world.





What works? – Evidence in practice

Within societal focus areas such as integration, health, business promotion, education, environment and social affairs, ensuring high quality and efficient use of resources constitutes an important challenge. But knowledge is often lacking about the way in which different measures work, which of them that work best, and which have no effect or are even harmful.

A strategic research effort in the field of evidence is to contribute to the more systematic approach to working knowledge based in areas that are important to society, thus improving the utilisation of resources, furthering fresh thinking, and increasing the impact and raising the quality of society's efforts.



Knowledge production and dissemination of knowledge in society

Research and the application of knowledge are important for development in the business sector, in the public sector and for society in the wider sense. As society's investments in research grow, the demands on publicly financed research to contribute to furthering the development of prosperity and managing complex societal challenges are also rising.

A strategic research effort is to make a contribution to creating the best possible conditions for the production, dissemination and utilisation of knowledge in society in the wide sense. It is the ambition to develop organisations, systems and incentives structures so as to best equip the world of research for the demands of society and the challenges of the future.



People and societal design

Sustainable transport and infrastructure

Better lifespaces – space for life and growth

Cultural understanding in a globalised world

Changing lives

Sustainable transport and infrastructure

Transport systems constitute the lifeblood of modern society, and transportation of people and goods on land, at sea and by air is rising and is expected to grow in the future. In light of the growing congestion, transport systems – both in Denmark and abroad – will be faced with a number of developmental challenges in the years to come. This applies to, among other things, the environmental impact of transport, energy efficiency, coordination and long-term integration in both cities and landscape.

A strategic research effort is to contribute to developing and future-proofing efficient and environmentally friendly transport and infrastructure systems that can satisfy the needs of society, the general public and trade and industry and reduce pollution, congestion and transportation time. Research is also to contribute to creating a better basis for long-term investment decisions, developing good framework conditions for the public and the private sector, creating new, innovative solutions and commercial opportunities, and developing better traffic safety.



Better lifespaces – space for life and growth

Lifespace is the interaction between physical space and social processes. Good lifespaces can be schools that further learning, hospitals that further health, or areas outside of towns where it is attractive to live and work. There are important challenges involved in progressive coupling of urban development, planning and social progress.

A strategic research effort is to contribute to long-term integration of physical planning and social processes with a view to developing lifespaces – businesses, living space, immediate environment, landscapes etc. – that further the quality of life, places that strengthen the individual experience of identity and community, where people wish to live and work, and which are attractive locations for companies.



Cultural understanding in a globalised world

The world is being linked ever closer at the present time. Internally, Danish society is becoming the meeting place of constantly more diverse – ethnic, national, ideological and religious – cultural currents. Externally, Danish players must often act in relation to other cultures in commercial, diplomatic, military and humanitarian contexts.

A research effort in the field of cultural understanding is to create a better knowledge base for strengthening the cultural competences of social players and equip Danish society, the business sector, the public sector and the general public, to be able to cope in a global world and to exploit the potentials of globalisation proactively. In addition, research is to contribute to supporting integration, preventing radicalisation and terrorism and strengthening the impact of Danish foreign policy and the involvement of the business sector in the global economy.



Changing lives

Great changes occur in terms of what it means to be a child, a young person, an adult and elderly, and it is a challenge to ensure that the design and structures of society interact positively with the changes in the course of a life. Key challenges include laying the basis for good lives, counteracting negative social inheritance and increasing the supply of labour.

A strategic research effort is to establish fundamental knowledge of the opportunities and needs of different age groups – with emphasis on the whole course of a life. The research effort, which inter alia involves welfare research, is to strengthen the basis for the development and future proofing of services, including renewal of the interplay between the welfare society's institutions, workplaces, services and social efforts.



Participants in RESEARCH2015

In the course of 2007 and 2008, many members of the general public, universities, research councils, public institutions, companies, ministries and interest groups made an active contribution to creating and refining the RESEARCH2015 catalogue. It is not possible to name all of them here, but below can be found the most important players who contributed to the work of RESEARCH2015 in phases 2 and 3. To these must be added the several hundred people who created the foundation for the work of phase 1 by submitting a total of 366 well-formulated and highly qualified proposals for research needs and themes.

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Ministry of Science, Technology and Innovation
Ministry of Employment
Ministry of Finance
Ministry of Ecclesiastical Affairs
Ministry of Climate and Energy
Ministry of Culture
Ministry of the Environment
Ministry of Refugees, Immigrants and Integration Affairs
Ministry of Food, Agriculture and Fisheries
Ministry of Health and Disease Prevention
Ministry of Taxation
Ministry of Transport
Ministry of Foreign Affairs
Ministry of Education
Ministry of Social Welfare
Ministry of Economic and Business Affairs

BUSINESS ASSOCIATIONS

Danish Shipowners' Association
Danish Construction Association
Danish Energy Association
Danish Chamber of Commerce
Danish Fishermen's Association
Confederation of Danish Industries

Danish Bankers' Association
ITEK
Danish Agricultural Council
Danish Association of the Pharmaceutical Industry
Service Industry

OTHER ORGANISATIONS

Danish Confederation of Professional Associations
Danish Association of Masters and PhDs
Danish Medical Society
Danish Regions
Danish Association of Lawyers and Economists
Danish Society of Engineers
National Association of Local Authorities
Danish Association of Managers and Executives
Danish Confederation of Trade Unions
Danish Medical Association
Universities Denmark

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Jane Kragelund, Director of Health, Region Southern Denmark
Jannik Schack Linnemann, Head of Research Policy, Danish Chamber of Commerce

Jens Christian Sørensen, Group Director, The Capital Region of Denmark
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Michael Svane, Director, Trade, Transport and Service
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Peter Blach, Direktør, Offshore Center DK
Peter Gæmelke, President, Danish Agricultural Council
Peter Looms, Senior Consultant, DR Media - Strategy & Projects
Peter Petersen, Development Director, B&O
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Poul Holm, Vice-chancellor, Roskilde University, Universities Denmark
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Poul Sørensen, Director of Research, LEO Pharma A/S
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Susanne T. Nielsen, Director, Rambøll Management A/S
Ulla Brockenhuus-Schack, Managing Partner, SEED Capital

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Svend Erik Sørensen, Director, Danish Crown

THE DANISH COUNCILS FOR INDEPENDENT RESEARCH

(workshop 11 – 12 March 2008)

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Synopsis of "RESEARCH2015 – A basis for prioritisation of strategic research"

This booklet is a synopsis of the publication entitled "RESEARCH2015 – A basis for prioritisation of strategic research", which consists of 21 proposals for strategic research themes. The themes are directed at challenges where Danish research and new knowledge can be the engine in the development of prosperity or contribute to meeting significant societal challenges.

The catalogue of proposals is intended to function as a source of knowledge and inspiration for the political work of prioritising funds for strategic research.

The catalogue is the result of an extensive process through which several hundred persons from universities, research councils, public institutions, companies, ministries, interest groups etc. have been involved in identifying the important strategic research needs in Denmark.

See more at www.forsk2015.dk