

# Report on roadmaps for the implementation of future transport research programme systems in Poland and Denmark

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## Table of contents

Abbreviations.....	1
Foreword .....	2
<b>DENMARK</b> .....	<b>3</b>
1. Introduction.....	3
2. The kick off seminar .....	4
2.1. The concept and participants of the kick off seminar.....	4
2.2. The outcome of the kick off seminar.....	7
3. The workshop on organisation and financing .....	8
4. The content of the strategy paper .....	12
5. The political process .....	13
6. The way forward .....	14
<b>POLAND</b> .....	<b>15</b>
1. Introduction.....	15
2. Polish National Innovation System .....	15
3. National public funding system .....	18
4. The political initiative .....	21
5. Research priority setting .....	23
6. Future prospects .....	25



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## Abbreviations

CLT	Centre for Logistics and Transport, Denmark
CTT	Centre for traffic and transport, Denmark
DRI	Danish Road Institute
DTF	Danish Transport Research Institute
DTU	Danish Technical University
EDS	Education Development Strategy, Poland
ENT	ERA-NET TRANSPORT
ERA	European research area
ERDF	European Regional Development Fund, Poland
EU FP	EU Framework Programme
EU-COM	Commission of the European Union
FIRE	Polish Centre of Innovation
GDP	Gross domestic product
GERD	Gross Domestic Expenditure on R&D
GUS	Central Statistical Office of Poland
ICT	Innovation and communication technologies
NDP	National Development Plan for 2004-2006, Poland
NFP	National Framework Programme, Poland
NTP	The National Transport Policy Plan, Poland
PAN	Polish Academy of Science
PKP	Polish National Railway
PLK	PKP Polish Railway Lines JSC
R&D	Research and development
RTO	Research and Technology Organisation
S-RTO	science, research and technology organization
SRA	Strategic research agenda
TDS	Transport Development Strategy, Poland
TP	Technology Platform
WP	Work package (+number within ERA-NET TRANSPORT)

## Foreword

Since 2004 ERA-NET TRANSPORT (ENT) concentrates on improving multi-national transport research policy cooperation and national transport research programme coordination among a number of European member states. This is actively done by organizing a dialogue platform, where national program owners and program managers from federal ministries and a number of subordinate state agencies (e.g. research funding agencies or transport infrastructure agencies) as well as public funding bodies (e.g. national funds or national research councils) are encouraged to cooperate and to collaborate, all for designing and implementing joint transport research funding and several other research support activities. ENT encourages transport research policy cooperation along the whole research policy cycle, starting at the policy strategy formulation and agenda setting stage, throughout policy decision on a program and the program implementation state to dissemination and program evaluation and even the single research project evaluation stage. It covers the thematic range of all transport research areas over all transport modes.

In 2005 Denmark and Poland became new partners in the ENT consortium. With this political leaning a new working task for ERA-NET TRANSPORT was outlined. The main objective of this task is to model guidelines, how to arrange and re-arrange national research programmes in countries, where particular national programmes are not introduced yet or countries, where former running national transport research programs were closed down due to other political priorities. A major requisite of the freshly arranged or re-arranged national transport research programs has to be the preconception “open for cross-boarder cooperation” and with that, national transport research programs, which are responsive for multi-national activities in ENT.

In both countries a policy process was started to develop a transport research policy strategy and to set up a research agenda for the way forward towards a national transport research programme. In this report the progressing policy process in both countries is described and the first outcomes of the processes are presented as initial signpost on the road towards national transport research programmes. Both countries take, due to their different political cultures, a distinct route and address dissimilar goals regarding the mission and the operation of the national transport research programme. While Denmark has a clear orientation on a transport policy mission and with that public funding for problem-oriented transport research, the mission in Poland is twofold. On one side there is the goal towards a transport policy oriented mission similar to the Danish route. On the other hand there is a strong technology and industrial policy mission focusing on the progress of the national innovation system by fostering R&D and in particular, science-industry relations. Transport industry is a central branch in the Polish industry and significant for the national economy with excellent national and regional industry clusters for railway (Katowice, Krakow, Warsaw district), for Maritime and Inland Waterways (Gdansk, Gdynia, Szczecin district) and for aeronautics (Dolina Lotnicza district).

The Danish part about the “Status for Danish Transport Research” was edited by *Ole KVEIBORG* and *Niels Buus KRISTENSEN* from the Danish Transport Research Institute (DTF – Danmarks Transport Forskning). The Polish part was written by *Prof. Marek SITARZ* (Silesian University of Technology, European Centre of Excellence for Railway Research, TRANSMEC), *Marta JACKOWSKA* (TRANSMEC), *Claus SEIBT* (ARC, Department of Systems research) and *Walter Wasner* (Austrian Ministry for Transport, Technology and Innovation)

# DENMARK

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## 1. Introduction

The point of departure for the process to establish a Transport Research Program in Denmark is the status description of the current situation and the history of Danish transport research, which was presented in deliverable 1.7. At the moment there is a situation of fast transformation regarding the framework conditions of transport policy and transport research policy in Denmark.

An important background for a forthcoming Danish Transport Research Strategy is the Government's "Strategy for Denmark in the Global Economy", which was published in April 2006. This political globalisation strategy is the outcome of a committee chaired by the Danish Prime Minister. The strategy contains 350 specific initiatives which together create a framework for extensive reforms of higher education and research programmes and provide substantial improvements for growth and innovation in all areas of society. A large part of the proposed goals aim at strengthening the quality and reorganising the governance patterns in education and research. The strategy focuses on improving the efficiency of public spending regarding education and research, in particular by allocating a higher public budget and by increasing internationalisation. A central goal of this strategy is that public and private investments in R&D should amount to 3% of GDP by 2010.

Following this strategy the policy of the Danish Government actively supports the mission to develop a new research programme for the transport sector. The ERA NET TRANSPORT idea and as well the Danish Globalisation Strategy focus both on initiatives to increase the outcome of transport research by increasing the efficiency of public funding, enhancing competition among national researches and motivating international cooperation.

In this report the policy process for developing a new transport research program in Denmark will be described. This process has not ended yet, so the final result of this action remains open. The process will be described by the following milestones:

- The kick off seminar
- A workshop on organisation and financing
- The content of a strategy document
- The political process
- The way forward

It is very important for the actual policy process to involve all relevant stakeholders in the discussions and integrate the input from the stakeholders into the strategy in order to develop a strategy which has a solid ground in the national transport sector.

## 2. The kick off seminar

The first public event towards the policy formulation of a national transport research program in Denmark was a kick off seminar which should establish a platform for the dialogue between all relevant stakeholders.

### 2.1. *The concept and participants of the kick off seminar*

The basic idea behind the kick off seminar was to start a policy process to work out a transport research strategy and to get input from the participants on the most important topics for future transport research in Denmark. We felt it was important to start an open dialogue where we got as many viewpoints as possible from the national stakeholder. Consequently there were only a few key presentations and the major part of the day was dedicated to the dialogue in groups. The group dialogues were guided by precise questions and instructions to avoid that the debate became unfocussed and to indefinite to figure out solid results.

It was important to get the dialogue with a broad group of representatives from the transport and transport research sector including the following interest groups:

- Researchers
- Civil servants from various parts of the public sector
- Policy makers
- Private freight operators
- Shippers
- NGOs in the transport area.

It was important to have representatives from the individual transport as well as the public transport sector. The wide stakeholder representation in the seminar to participate in the policy process should give the broadest possible input to the formulation of a future transport research program and should anchor the strategy in the transport sector in order to get the political support when needed.

It was also very important to get the top management in the Ministry of Transport involved in the program – including the Permanent Secretary for the Ministry of Transport.

These considerations lead to the following agenda for the kick off seminar:

#### **PROGRAMME**

9.00 – 9.15	Welcome and the aim of the seminar by Helga Theil Thomsen, Head of Department, Ministry of Transport
9.15 – 10.15	<b>Presentations:</b> The importance of Transport research by Thomas Egebo, Permanent Secretary, Ministry of Transport The Road sector and the research needs by Knud Erik Andersen, Head of Department, Road Directorate Innovation and research – the national framework conditions by Peter Holsøe, Ministry of Innovation and Research
10.15 – 10.25	Break

10.25 – 12.40	<b>Group Dialogue 1:</b> The importance of Transport Research for different stakeholders <i>The aim of the group dialogue was to identify the importance of Transport research for various parts of the Danish society and to provide a common understanding within the group of participants</i>
12.40 – 13.25	Lunch
13.25 – 15.50	<b>Group Dialogue 2:</b> Proposals for future research themes <i>The aim of the second group dialogue was to select the most important research themes to be included in a future transport research strategy.</i>
15.50 - 16.05	Break
16.05 - 16.20	Prioritisation of research topics
16.20 – 16.40	Results of the seminar
16.40 – 17.00	Status for Transport Research in Denmark 2005

The structure of the kick off seminar proved to be very important for the outcome and will be described as follows.

The presentations in the morning gave from the perspective of the Permanent Secretary the clear message that the ministry assumes transport research of great importance and that it was regarded as very crucial to get a solid background for policy making in the transport sector.

For each group dialogue there were strict instructions for the discussions. A chairman was selected in each group to make sure that the instructions were followed. First everybody should give a one minute life story. After this each participant should write their input on *post-it's*. Next step was to have a *tour de table* where each participant presented his ideas – no discussion only questions for clarification. Finally – when all input was at the table and written on yellow *post- it's* the discussion and prioritisation took place. After each group dialogue the result was put on a whiteboard. There were instructions how to present the results.

After the first group dialogue the groups were split and new groups were created in a way, that all groups from the first dialogue were represented in the next groups. With that the previous group results could be explained in a short way to the new group to continue discussion.

In the second group dialogue on research themes the researchers were in a distinct group. This was to ensure that it was the future research demands expressed by the users of the research. The researchers were in one group, and they were asked to reflect on the results of the first group dialogue to give recommendations for how to create a stronger platform for transport research based on the importance expressed by the transport sector representatives.

During the break following the second group dialogue, the organisers of the seminar clustered similar research topics in order to have a presentation of all ideas on the whiteboard with no overlapping proposals. The participants got five votes each to vote on the proposed topics, which were of high importance from their point of view.

As a result of this voting procedure a prioritised list of themes for future research could be considered as a clear outcome of the seminar. On this basis it was interesting to have a presentation on the current situation of Danish transport research, in order to identify gaps and the need for future effort to strengthen the transport research arena.

The participants in the kick off seminar represented a wide group of actors in the transport sector. It should furthermore be noticed that most of the organisations were represented by their directors, which underlines that high priority was given to participate in this seminar on transport research priority setting in Denmark. The following organisations attended the dialogue seminar:

***Ministries:***

Ministry of Transport and Energy

Road Directorate

Danish Rail Authority

The Danish Energy Agency

Ministry of Science Technology and Innovation

Danish Maritime Administration

***Research Organisations***

University of Southern Denmark

Technical University of Denmark

Roskilde University

Aalborg University

The Danish Transport Research Institute

Danish Road Institute

***Shippers and private operators:***

ARLA Foods

Danish Railways (DSB)

***Councils and Associations***

Danish Industry

Danish Transport and Logistics (Haulers Association)

Danish Association for Municipalities

Danish Association for Counties

The Council for Traffic Safety

The Danish Bicycle Organisation

Car-owner association

***Consultants***

COWI, TetraPlan, Rambøll Nyvig, Carl Bro

## **2.2. The outcome of the kick off seminar**

The most important outcome of the kick off seminar was a common viewpoint, that there is a need for more transport research in Denmark. The following observations were underlined:

- Several groups highlighted the need for a stronger priority to disseminate research results. The distance between researchers and end users is too wide.
- The organisation of the public authority side of the transport sector and specifically for the promotion of the transport research sector is spread on many institutions and has no individual platform. The Ministry of Transport and Energy, Ministry of Taxation, Ministry of Finance, Ministry of Justice (traffic safety), Ministry of Environment and Ministry of Industry and Economy are all involved.
- Transport is a very important topic in policy discussions and authorities spend a large part of public budgets on transport and transport infrastructure. But the transport research results are close to invisible in that debate. The need for research is not sufficiently acknowledged by the research funding organisations
- The research institutions are small and exist on short term financing, which make it very difficult to recruit young researchers.
- Several groups expressed how important it is, to integrate the Danish R&D activities in the international research arena.
- The need for a trans-disciplinary approach to transport research was highlighted. The technical and economic approach should be integrated in the particular research activities. And as well cross- sector research in the area of health, food, training, cycling and lifestyle could be relevant.
- The need for ex post assessments of new transport infrastructure projects to provide feed back and ex ante evaluations were mentioned as an important topic.

The topics for research with the given priority after voting showed following results:

### ***Infrastructure Planning and maintenance (19 votes)***

- Well maintained and safe road and rail infrastructure
- Decision support systems (models covering all transport modes and societal costs)
- Freight infrastructure both road, rail, maritime and multi-modal
- Long term traffic prognosis for all transport modes

### ***Congestion alleviation (19 votes)***

- Congestion alleviation both on rail and road
- Efficient use of the infrastructure
- Intelligent Transport Systems (ITS)

### ***Freight Transport (17 votes)***

- Freight on rail; will it have a future in Denmark?
- ITS use in road freight transport
- Intelligent logistics

### ***Transport Behaviour (15 votes)***

- Transport and health
- Transport and education
- Improved understanding of future transport demands and traffic culture

### ***Transport safety (12 votes)***

- Improved safety in road transport to reduce human and social costs
- The elderly in traffic and traffic safety
- Bicyclist safety
- ITS and safety

### ***Assessments of social cost (12 votes)***

- Improved tools and methodologies
- Improve quality of the costs to make the assessments more reliable
- Include also the soft areas in social cost assessments

### ***Visions for the transport sector (10 votes)***

- Infrastructure needs for the next 20-30 years
- The reliable background for development of policy goals and measures
- The importance of transport in the future society

### ***Sustainable transport (10 votes)***

- The shift to other fuels than oil in the transport sector
- Measures to reduce air-pollution - especially small particles in urban air
- Noise abatement policies

### ***Urban transport (6 votes)***

- Measures to reduce congestion
- Measures to reduce the impact of traffic on urban environment
- Improved accessibility in urban areas

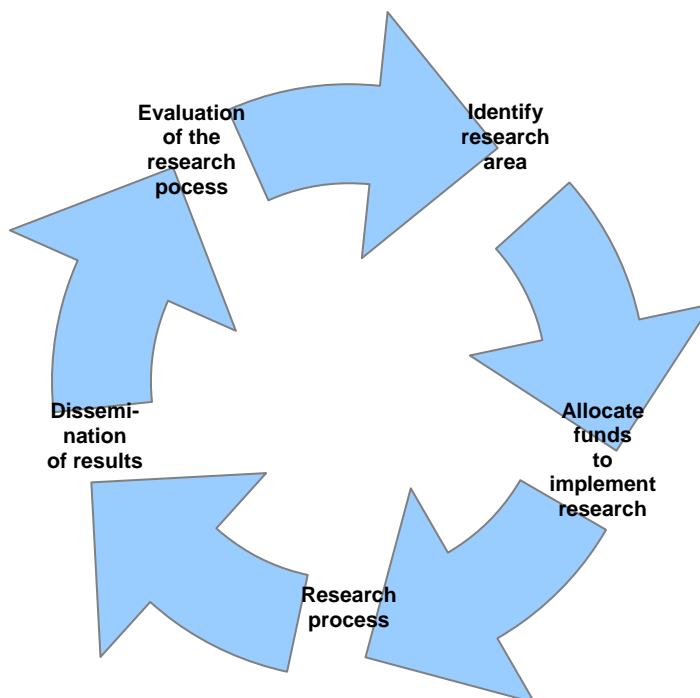
All these recommendations were taken on board of the process of the formulation of a new transport research strategy for Denmark. A summary of the recommendations from the seminar has been sent to all the participants right after the meeting.

## **3. The workshop on organisation and financing**

At the first of February 2006 a workshop was held to discuss relevant ways to publicly support transport research. The workshop should give input from the stakeholders, what type of governance could be proposed for the organisation of a new Danish transport research programme. To set the scene for the discussion two presentations were made. The first one to introduce a programme organisation concept to use as a base for the discussion and secondly a presentation from the Norwegian Ministry of transport to share the experiences from the Norwegian research funding programme system.

The proposed programme concept for the dialogue was called the research process chain. It outlines the governance or policy coordination phases during the research process. When setting up a new research programme it should be decided, how each of these steps could best be handled.

**Figure 1: Research process chain**



The research process chain covers all steps taken in the research process from the very first identification of the need for research in a certain area to the end use of research results. The research chain will have at least the following steps:

- Identification of the research themes
- Organisation of research management
- The research process
- The dissemination of results
- Evaluation of the research process

The types of questions for each of the steps are given below:

**Identification of research areas:** How should the research themes be identified? Should it involve the policy level, when the overall priorities are selected? Should it involve other relevant stakeholders in the more detailed identification of themes? Is a transparent pre-defined procedure very important – or is the ability to quickly adopt the agenda flexibly to a new demand even more important?

**Organisation of research:** Is it a transparent procedure with open calls for proposals within well-defined thematic areas? How should the project proposals be selected?

**Funding of research:** Who (what organisations) should fund transport research? Should public funding be earmarked for transport research or should it be allocated in competition with other areas? Should funding be allocated to research groups in a few large projects or divided in smaller projects?

***The research process and the institution:*** Should priority be given to trans-disciplinary research teams or to building capacity within individual disciplines? Should the resources be concentrated in few organisations with critical mass?

***Dissemination of research results:*** Should specific funding be allocated to dissemination? Should special dissemination channels be created? Who should the dissemination be directed towards (other researchers in scientific publications or to the policy makers through reports and conferences)?

***Evaluation of research process and results:*** Much knowledge can be gathered through a stringent evaluation of the research process, the research results and the end-use of these results. The cultures to evaluate research are very different within the different funding bodies and regarding the different research themes.

### **The Participants in the workshop**

For this workshop a smaller group was invited than for the Kick Off seminar. The following institutions were represented.

#### ***Ministries***

Ministry of Transport and Energy

Road Directorate

Ministry of Research Technology and Innovation

#### ***Organisations***

Danish Industry

#### ***Research Institutions***

University of Southern Denmark

Technical University of Denmark

Roskilde University

Aalborg University

The Danish Transport Research Institute

Danish Road Institute

#### ***Consultants***

COWI,

TetraPlan,

Rambøll Nyvig

In the group dialogue the groups were asked to discuss each step and give their recommendations and views on how to organize each step in the research process. Furthermore the groups were asked to provide good arguments for their position.

The joint outcome of the process was:

**Identify Research Areas:** The Sector Ministry should set the overall agenda for the research programme, but not perform any detailed steering of the research process.

It is important to use existing programme organisation systems and not create new ones for transport research. A model with two sub-committees was recommended; one to evaluate research activities and another to evaluate demonstration activities.

It is important to have a close link to all potential users of research results, when identifying future research areas. The current transport research arena in Denmark is not sufficiently focussed on the needs of the industry.

**Organisation of research:** It is important to have a minimum of free research funding for the research organisations, and the current level is not sufficient to ensure high quality of research. A right balance between bottom-up and top-down should be provided.

The funding for transport research should somehow reflect the importance of the sector. The basic funding could depend on the amount of external funding that an institution could attract. This would encourage the organisations to be competitive.

**The Research Process:** Even though the transport research organisations are small, it would not be an advantage to joint them all into one large research institution. Each one has their own profile and educates new candidates with this profile. A geographic spread of research organisations is beneficial in order to provide candidates for the sector in all regions.

We should build on present organisations and human resources in a long term perspective in order to create a strong Danish transport research environment. This will take time.

**Dissemination:** There is a huge demand to improve the dissemination of the research results. Small demonstration projects could be one instrument and a high quality magazine like the Norwegian "Samferdse" could be another.

Priority should also be given to public finance the dissemination of the research results. Dissemination activities should not only be a part of a research project, but also separate activities of gathering international and national research results regarding a specific research topic in order to make better use of these results. This is well-known from other sectors.

Not all types of research results should be disseminated in the same way.

**Evaluation of research:** Evaluation of the quality of research works well in the current system. There is no need for change. However, the need for evaluation of usefulness of research results for industry and other end users is less developed.

## 4. The content of the strategy paper

Based on the two seminars and further discussions in the Ministry of Transport it was decided, that a strategy paper would be a necessary document in order to be able to argue for the challenge of transport research, whenever a window of opportunity is opening. The document should be easy to read and provide in a simple way the whole set of arguments for the implementation of a new Transport research programme in Denmark. The content of the document is the following:

**A summary** of two pages highlights the demand for an innovative Danish transport sector in the Global economy and points out the relevance of the transport sector by some main statistics. It is underlined that a new national transport research programme could make Denmark a much stronger player in the 7<sup>th</sup> Framework programme. The national transport research programme should strengthen transport research in order to provide high quality candidates for the transport sector. The transport sector (transport industry, operators, public authorities) should have a clear role for identifying new thematic areas for research and in the dissemination phase venturing research results into innovative business. Public funding should be allocated in open competition and be a long term commitment.

**A permanent innovation process:** This chapter highlights the importance of a well functioning transport sector for continuous economic growth; economic key figures from the Danish transport sector are given. Furthermore, the future challenges for transport systems and transport infrastructure are highlighted and the demand for research and innovation to meet these challenges.

**Globalisation and transport:** The transport sector will be even more important in the global economy as transport volumes and transport modes will change. Seamless transport chains from the production lines in Far East to the Danish consumer and similarly from highly specialised Danish producers to consumers all over the world is vital for the Danish economy.

**Transport research and globalisation:** Also transport research must develop in an international context. Several problems are similar in most European countries and problem solutions should be worked out in trans-national research networks. Cooperation and Collaboration among researchers has a long history, but cooperation among research programme managers in the course of ERA NET TRANSPORT should be in focus for a new Danish transport research programme.

**The Danish public research support system** is described with the different research councils and their programme management schemes. The weak public funding of transport research is highlighted and demonstrates a need for further public engagement if the previously mentioned challenges shall be met.

**A new Transport Research Programme** is outlined. The focus should be on the anchorage of this programme in the transport sector by focussing on the involvement of public authorities, transport industry and the transport research arena when identifying research themes as well as placing a strong focus on dissemination of research results. Furthermore it is important to define clearly the responsibility for knowledge development at public authorities and not mix this up with a professional research programme management of the involved funding bodies. The focus on international cooperation and coordination is a further strong point.

**Focus of the Transport Research Programme:** The identified themes for future research funding activities are described. They are the input from the kick-off seminar and organised following the end user: citizens, Industry and public sector.

**From research to end use:** This section focuses on the challenge of dissemination of research results to the vast number and types of end users for research results. The need for the consolidation of research results from various sources, which should be done after the research process, is mentioned as well as a very efficient dissemination strategy by following the research process. Finally, it highlights the need for a Danish transport research magazine to host a knowledge based dialogue between the stakeholders in the sector.

**New Fuel to Transport Research** is the final section which has a brief description of the present situation in Danish transport research, e.g. the research organisations with their specific foci on thematic areas and the current public funding situation.

## 5. The political process

As mentioned earlier, the Danish Government announced the objective to increase the budget for public research funding in March 2005, in order to meet the Lisbon goals by 2010. In the statement of the government a number of different strategic issues were mentioned including strengthening strategic research. But transport research was not mentioned explicitly in this document. The Danish Ministry for Transport and Energy presented in November 2005 a blueprint for an organisation process to create a national strategy for transport research. The ministry agreed to this process, but could not promise a financial budget for a Danish Transport Research programme, because financial matters have to be discussed at first within Danish Government and secondly they have to be approved by the Danish Parliament.

The first draft version of the strategy was presented in April 2006 to the Minister for Transport and Energy and he agreed that the work could continue. A new draft version of the strategy was completed in June 2006 and presented to the minister again, who decided to discuss it with members of the Parliament Committee for transport in August (after the Danish summer holiday). The minister presented the strategy to the members of the Parliament Committee in late August 2006. They accepted the strategy but had certain questions and comments concerning the draft version of the strategy document. This version was then adjusted to meet the comments and finally published mid October 2006. It was sent officially to the Danish Parliament and was published just as talks and negotiations are taking place between the government and the opposition party.

In the beginning of November 2006 political agreement between the Danish government and the opposition resulted in a new transport research programme starting 2008 onwards.

## **6. The way forward**

There now is a financial budget for a new public transport research programme. The tasks now will be to define in detail, how the funding should be managed and how to establish a governance system which can meet the demands from the sector to the programme:

- The anchorage of the programme in the transport sector, involving representatives from industry, research and public authorities
- The professional administration of the funds in a competitive system
- A focus on better dissemination of research results to the end users
- The focus on international coordination and cooperation at the programme level

It will be the Ministry of Transport and the Ministry of Science and Innovation, which will be in charge of the future process. The next phase of the work will start when the political decision on the funding has been taken.

# POLAND

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## 1. Introduction

Research and development (R&D) or science, technology and innovation (STI) are main factors for the competitiveness of enterprises in modern economies as well as for the growth of national economies. The ability and intention of enterprises to permanently adapt actual research results and new technological developments for new product design or better production routines drive economic development and competitive advantages. There is a distinct picture in modern societies, that technological change and high economic performance arises along a value chain starting with basic research via applied research towards experimental development and new product design and further innovation activities, like the introduction and diffusion on markets. In a global economy western industrialized countries perform as knowledge intensive economies up-stream or down-stream the actual production chain with science, research and engineering – or later – marketing and distribution logistics along international value chains, or they perform as niche players for specific products. Mass production is meanwhile performed in China or India.

At the 4th of September 2006 the Polish government ratified a new strategic document "Directions towards the increase an innovativeness of the economy for 2007-2013". The document follows the report "Increase of economic innovativeness in Poland till 2006". In the document the current status of innovation activities in Polish economy is assessed and several economic and social factors to form a knowledge based economy in Poland are characterized. One of the main goals mentioned is the enhancement of innovation performance in public and private enterprises. Furthermore the importance of entrepreneurship and management qualification, public and private expenditures on R&D, intellectual property rights as well as the further enhancement of the national innovation system is underlined.

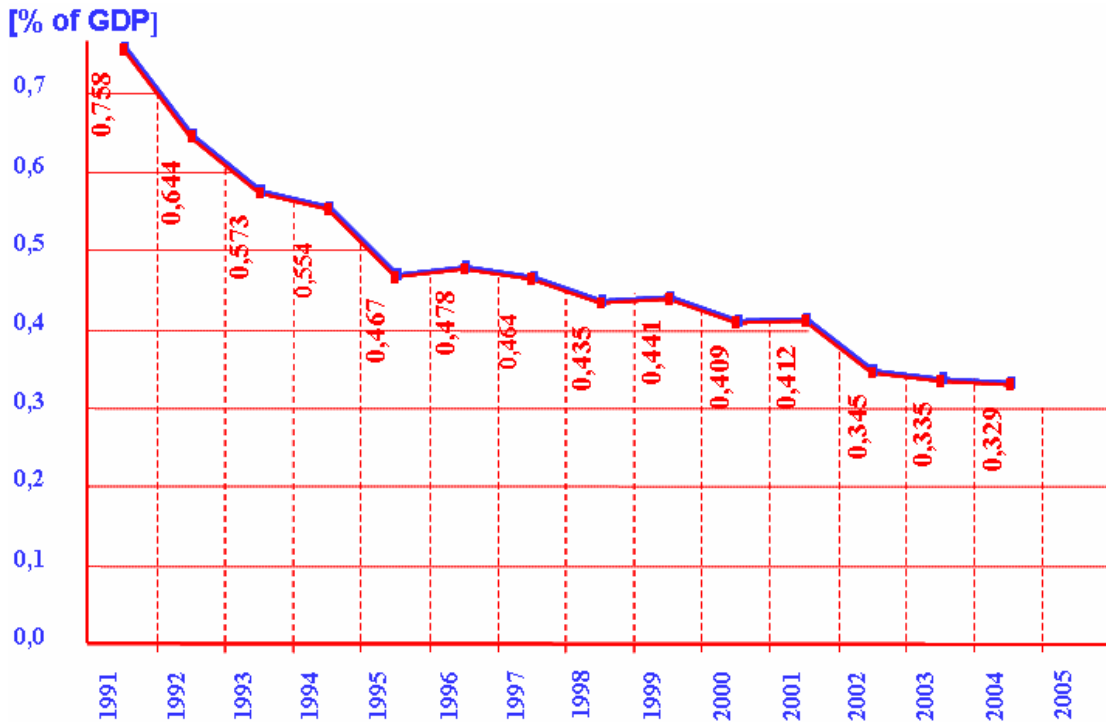
## 2. Polish National Innovation System

According to the European innovation scoreboard the actual innovation performance of Polish industry is rather low. An important figure of this scoreboard is the input indicator on private and public research and development expenditures (GERD - Gross Domestic Expenditure on R&D). The GERD amounted in 2003 to 4.558,3 million zloty, whereas the relation GERD/GDP is one of the lowest in the EU and OECD countries (0,56 % in the year 2003).

The National Development Plan for 2004-2006 assumes a growth of this relation to 1,5 %. The part of GDP allocated for private and public expenditures in scientific research and R&D is at the moment around 0,33 % of the national GDP, which is very low compared with Japan (3,1 %), Czech republic (1,2 %) and with the average in other EU countries (2 %).

The diagram below shows a decline of private and public scientific research and R&D expenditures in Poland in the past ten years. With that the Lisbon goal (3% of the national GDP invested in scientific research and R&D at 2010) is still far away.

**Figure 2: Share of GDP expenditures on science (1991-2005)**



Source: Ministry of Science and Information Society Technologies (2005)

Today there is a growing debate on the transition of the Polish national innovation system. According to the document "Main science and Technology indicators in Poland 2000-2003" a steady increase of awareness in Polish society, regarding the role of innovation for economic and social development, could be observed. This debate is related to the current transition of the Polish National Innovation system. In this process several official agencies and advisory bodies, as well as individual national and foreign scientists and other experts are involved.

Earlier strategic reports like the document "Increase of economic innovativeness in Poland till 2006" (from 2000) proposed a number of reforms for the Polish National Innovation system. This document was the basis for the transition process of the Polish national innovation system during the period 2000-2006. The number of companies offering products based on new technological developments increased significantly during these last six years.

Essential for the practice of the National Innovation system is the institutional infrastructure for scientific research and R&D. In Poland there is a large institutional landscape for science and academic research like university departments, departments of the Polish Academy of Sciences and a large number of non-university research and technology organizations (RTO). The large number of public financed scientific research units is a political heritage of the communist era. On the other hand there is a very low performance in Polish industry regarding research and engineering today. The large research and engineering departments of the former state industrial complex were shut down during the post-communist era.

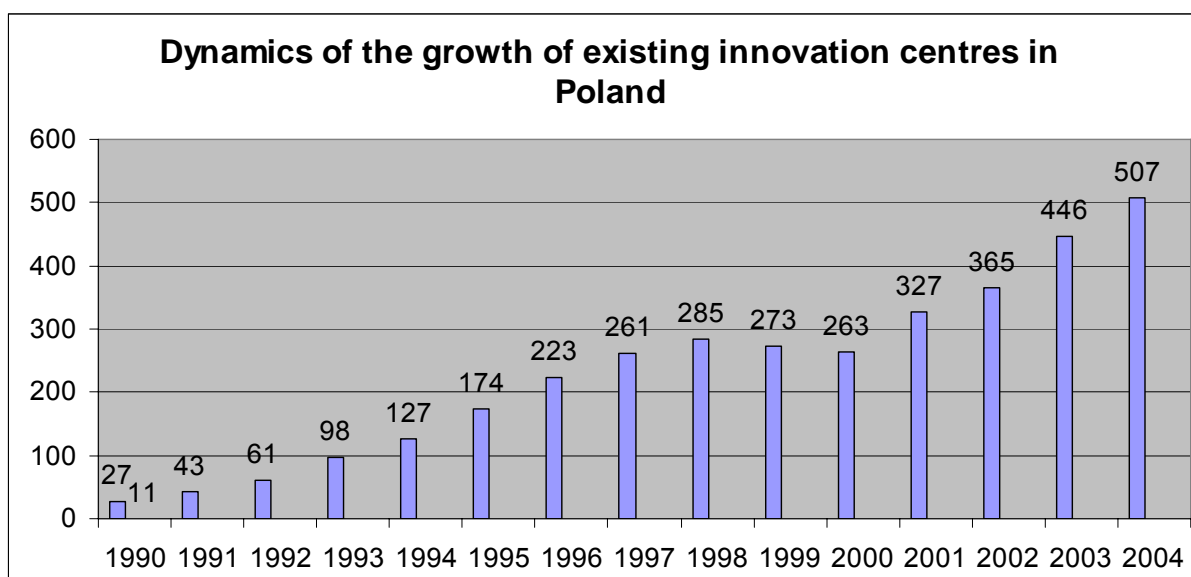
A minor part of these departments were converted into public research and technology organisations (RTOs) often attained nearby a university. The slight percentage decline of public and private expenditures on R&D (see above) is in our opinion due to this re-organization process.

During the last few years a new institutional sector emerged in the Polish National Innovation system. Several industrial promotion and technology transfer agencies as for example the Polish Agency for Enterprise Development, the Industrial Development Agency, the Centre of Innovation (FIRE) or many other cross-regional and regional organizations for technology transfer or patent information as well as technology and science parks emerged. According to the document "Directions towards the increase of innovativeness of the economy for the years 2007-2013", the number of organizations to support innovation activities increased significantly in the last few years. In 2004 the following organizations were counted:

- 280 training and advisory centres
- 29 centres for technology transfer
- 76 local loan funds
- 57 credit guarantee funds
- 53 enterprise incubators
- 12 technology and science parks

The following diagram shows the gradual increase of innovation support centres in Poland. From the year 2000 till 2005 the number of these centres nearly doubled.

**Figure 3: Innovation centres in Poland (1990-2004)**



*Source: Economy institute of Lodz University*

The number of innovation support centres improved in our opinion so rapidly as a result of the European structural funds financing the development of science and research infrastructure. The European structural funds are at the moment the backbone of the transition of the Polish National Innovation System. But not only the structure of the innovation system has to be transformed, also the relations among the actors in this Innovation System. Piotr Sztompka, head of the department of sociology at Kraków university, indicates that the individual interactions in Polish

society have to change. The inherent quality in a National Innovation System is innovation culture, which is in fact much more important than all structural and institutional arrangements.

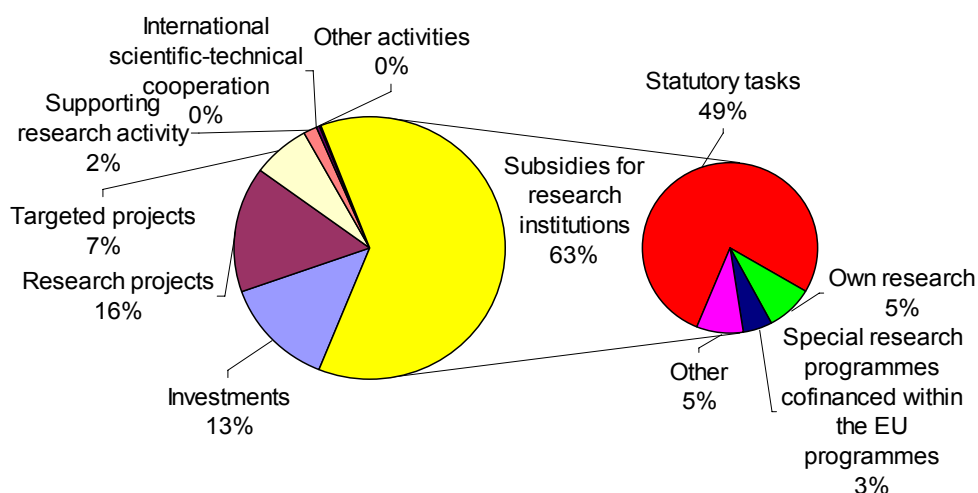
### 3. National public funding system

In Poland the public funding for scientific research and R&D is administered directly by the ministries, no subordinate public research promotion- and funding agencies are established yet. There are several ministries who finance research. But most of the ministries have only small budgets to finance contract research, e.g. for policy advice or particular expertise. Only the ministries of higher education and science and the ministry of commerce hold large financial budgets for scientific research funding and for financing R&D and innovation in companies. Both ministries act as main funding bodies in Poland. The ministry of Science and Higher Education acts as funding body for scientific research and R&D. The ministry of commerce acts as funding body for R&D, engineering and innovation activities in companies.

The highest share of the public funding budget in Poland runs into institutional funding. The main statutory tasks of the numerous public science, research and technology organizations (S-RTO) have to be financed. Some of these organizations hold as well minor budgets to organize smaller research funding initiatives partly co-financed by European support actions. Large research organizations like the Academy of Science have beyond the financing of their statutory work as well the option to fund collaborative research projects with partners outside the organization.

Regarding the overall research funding budget of the Ministry of Science and Higher Education a much higher budget share runs into subsidies of Polish public research organisations than in the open grant system for scientific research and R&D. By this open grant system, research projects, research infrastructure expenditures, targeted projects, and several other research support and cooperation activities are funded.

**Figure 4: Structure of the public STI expenditures in 2004**



Source: Dariusz Drewniak, Ministry of Science and Higher Education

The Ministry of Economy administers as well a comparably high budget to finance RTOs and particular innovation support actions. Most of the RTOs are actually now under supervision of the Ministry of Economy. The Ministry of Economy manages as well the National Capital Fund. This commercial fund is in charge to support small and medium sized companies with a large developmental potential and supports R&D and innovation activities in companies.

Last year a new law for supporting R&D and innovation activities was adopted in the Polish Parliament. The major goal of this law is to enhance economic development in Poland by expanding public and private expenditures on R&D and innovation. The new law underlines the importance to establish better legal and organizational conditions to promote scientific research and R&D in Poland. The acclamation of the law is the starting point for the reform of the Polish public research funding system.

Subsequent to the law a governmental act was decided on new regulations for science and research funding and a blueprint for a first integrated national research program – the so called Polish Framework Program. The following thematic areas are underlined in this draft for a National Framework Program:

1. Health – prioritised research areas are epidemiology, molecular base and risk factors, aging processes, pathogenesis, genetics, molecular biology and biotechnology, environmental state and impact of sanitary risks, transplantation and regeneration medicine, innovative pharmacological drugs
2. Environment – environmental management, economic development as a factor of climate change, biological variety and its protection, optimization of cities and regions, better natural resource utilisation, sustainable economy
3. Agriculture and food – food security, biological development in agriculture, veterinary protection and public health
4. State and society – competitiveness of Polish economy under the state of competition and sustainable development, cultural traditions and preservation of material and intellectual heritage in Polish society
5. Safety and security – management of critical infrastructures and situations, early warning systems, information system security
6. New materials and technologies – multifunctional nano-materials and nano-systems, advanced structural materials as well as advanced electronic and optoelectronic applications
7. Information and Communication technologies – development of data infrastructure, modelling systems, decision support systems, mobile technologies
8. Energy and energy supply – modern technologies for power generation and heat processing, storage of energy, effective utilization of coal, energy supply security, renewable energy sources; research in this field aims at long-term transformation of the national energy system by using diverse energy raw materials and by increasing the effectiveness of energy processing and storage.
9. Transport infrastructure and systems – innovative components for the infrastructure renovation, development of transport systems, improvement of traffic safety, optimization of transport and logistic management, innovation in transport services, interoperability of different transport modes

Today the Polish public funding system is still a grant system. That means that research funding applications are handed in directly to the actual funding bodies. There are no particular thematic funding programs established yet. The blueprint for a Polish National Framework program is the first attempt to focus particular thematic research areas, which are most important for the social and economic development in Poland. In an expert consultation process these thematic areas were deliberated. In this consultation members of the Polish Science and other Academies as well as representatives from technology platforms, industry and experts were involved.

Public funding in Poland is administered by the departments of the ministries. The decisions on financial support are taken under the supervision of the particular minister. An important role in the Polish public scientific research and R&D funding system plays the so called Polish Council of Science, which replaced the former Committee for Scientific Research. The Council of science constitutes a formal representation of the Polish science and research community and plays an advisory role to the Minister of Science and Higher Education. The Council for Science is independent from the Ministry in giving its recommendations.

The Council is split into four collegial bodies:

- Committee for Science and Technology Policy,
- Committee for the support of Science and Technology,
- Committee for the support of economic development and a
- Committee of appeal.

The Council for Science as such is not in charge to take decisions regarding the actual funding of particular research projects or the institutional funding of RTOs. The competence to decide on funding stays in the hand of the minister. However, before taking decision on grants for research projects the minister is obliged by law to submit all applications to the Committees of the Council in order to attain policy advice (Art. 3 Section 3 of the Act on Principles of Science, Research Funding). The particular Committees act as peer review system for incoming research funding applications. They present their peer reviews as a simple ranking of the applications or as a proper project proposal evaluation. The minister issues his funding decision on the basis of the Committee's suggestions.

The official public grant funding system in Poland has today still a comparably low funding budget due to the much higher public budget share for institutional funding. The grant system has as well other diseconomies. It delays e.g. the transition from disciplinary single project funding to trans-disciplinary cooperative project funding. The major challenge at the actual stage of reform of the Polish National Innovation System is in our opinion to strengthen the relations among key-actors – in particular the science-industry relations. For that the major policy instrument is the funding of collaborative research projects. Scientific research and R&D projects where partners form different fields of society work together. For example the academy of Science works together with a department for applied science at Warsaw University and as a third partner a public or private enterprise is involved.

The specific funding of collaborative research goes in hand with further functional public funding activities, e.g. to enhance research network building or to promote engineering and management training. The style of funding collaborative research projects has been proved as major success for market oriented research and as the best way for knowledge and technology transfer.

To enhance the science-industry relations and to motivate collaborative research projects along the research value chain – with a clear aim of producing the basis for innovative products or marketable services – is currently the most prominent policy approach to drive Innovation in nearly all European member countries.

#### **4. The political initiative**

One key action in ERA-NET TRANSPORT is to support Poland and Denmark to prepare and implement a national transport research program open for multi-national cooperation. In a joint workshop in 2005 ERA NET TRANSPORT was represented in the Ministry of Higher Education and Science in Poland – a design for a national transport policy strategy and program formulation process was suggested. The suggestion of ENT was seized by the Polish Ministry of Science and Higher Education and the Polish Transport and Construction Ministry at the end of 2005. Both ministries acclaimed the preparation of a joint program for transport science and research for the years 2007-2013. There are currently significant reforms in the Polish public research funding institutions and with that, good opportunities for re-arrangements in the research funding system.

In advance to the actual strategy formulation process a number of surveys are conducted observing the present status and the perspective of Polish transport science and research, looking at the status of transport research policy coordination and present transport research support activities in Poland.

- Survey of the present status and future perspectives for scientific research and R&D in the transport sector as well as on human resources in this sector
- Survey on the present status and the expected renovation and further development of the Polish transport infrastructure for the years 2007-2013
- Survey on the present status of national transport research project funding in Poland (overview of public grants for transport research projects)
- Survey on the present status of Polish transport research organizations participating in trans-national and multi-national transport research networks.
- Survey of national transport research policy coordination activities, the role of Technology Platforms and other initiatives for the years 2007-2013.

The first step necessary for the formulation of a joint transport research policy strategy is to create a dialogue platform among public authorities and stakeholders for the transport sector and transport research sector. Main goal is to integrate scientific, industrial, governmental and parliamentary circles connected with transport policy and transport research policy in the formulation process. A range of seminars with major key players from the public sector and from science and industry will be organized.

The kick-off seminar will be held at the end of November 2006. The seminar is guided by the Polish Ministry of Science and Higher Education together with the Polish Ministry of Transport and Construction.

Among people invited to take part in the kick-of conference are representatives from several national ministries:

- Ministry of Science and Higher Education,
- Ministry of Transport and Construction,
- Ministry of Environment, Ministry of Economy,

- Ministry of Regional Development,
- stakeholders from industry represented by members from the Polish Technology Platforms (Railway Transport, Road Transport, Air Transport, Maritime Transport),
- representatives from the Transport Committee of the Polish Academy of Science and the Polish association of transport engineers and technicians,
- representatives from national transport service providers (e.g. the Polish national railway operator PKP, the national aviation company PLL LOT and the national road and motorway directorate,
- deans of transport faculties at the universities,
- members of the European and the National Parliament, several deputies of Sejm (lower house of parliament),
- a representative of the Polish president and
- Representatives of the Polish Council of Science and the National contact point for EU-COM programs in Poland.

### *Agenda of the Seminar*

The agenda of the seminar foresees a number of presentations in three sessions:

*Session 1: 10.00 – 12.00*

1. Financing of the science research in Poland. Present condition and possible future alternatives, Krzysztof Kurzydłowski
2. Research priorities in the 7th Framework Programme, Jerzy Buzek
3. Priorities in European transport research, Bogusław Liberadzki
4. Priorities in the transport development in Poland, Eugeniusz Wróbel
5. New possibilities of Polish science and research financing in the field of transport within a framework of ERA-NET TRANSPORT, Marek Sitarz

Discussion

*Session 2: 12.30 – 14.30*

- Financing of the transport from the European regional funds, Jan Olbrycht
- Financing of the Polish transport science by the industry, Adam Gierek
- Financing of sustainable transport research from the European ecological funds, Genowefa Grabowska
- Mechanisms of science financing in Poland and the world, Michał Kleiberg
- Didactic and potential of the Polish transport science, Janusz Dyduch
- Possibilities of the transport policy financing in Poland – Chairman of the Sejm Commission of infrastructure – Kołodziej Janusz
- Possibilities of the Polish transport infrastructure projects financing within the framework of ordered projects - Edmund Wittbrodt
- Financing of innovative undertakings in the field of transport, Krzysztof Gulda

## Discussion

*Session 3: 15.00 – 15.30*

- Summary of the conference, performed by
  - Krzysztof Kurzydłowski, the Undesecretary of State of the Ministry of Science and Higher Education
  - Eugeniusz Wróbel, the Secretary of State of the Ministry of Transport

The kick-off seminar will be the starting point for the formulation of a Polish transport research policy strategy and a corner stone to establish a dialogue platform for the coordination among public authorities and science and industry circles regarding Polish transport science and research policy.

One of the first results of the forthcoming joint policy process will be the identification of central strategic transport research missions, that means, the thematic transport research areas, which are of main interest for the social and economic development in Poland. The relevance of a joint research policy strategy for transport science and research is strongly underlined by the participation of many different stakeholders in the policy process. Diverse viewpoints from particular stakeholders and the coordination with the objects of the public authorities on thematic areas for future transport research will assist to achieve a joint transport research policy strategy.

Other expected results will be for example a broad discussion on the present situation of transport infrastructure development and the current situation and future perspectives of transport science and research in Poland. Furthermore an important result will be the debate on present funding opportunities for transport science and research and future options how to set up new transport research funding modes in the national public funding system.

## **5. Research priority setting**

At present there is a large debate in innovation research regarding good practice how to raise the efficiency of national public funding systems. There is on one hand a position which argues to sustain the diversity of the national science and research by more unspecific public research grants. On the other hand there is a position for tactical research priority setting. The expectation behind the last position is that limited financial resources for public research should be directed in some of the most advantageous thematic areas where national research competences and human and infrastructure capacities are high and surpassing economic growth effects can be induced (e.g. by promoting structural changes to level up the existing low-tech industries to more innovative high-tech industries). A further important expectation is that societal problem solutions, respectively relevant in the national context, can be addressed by particular research missions.

For an accurate transport research priority setting process it is crucial to specify research topics for the identified thematic transport science and research areas. To do this it is required to extend the stakeholder involvement and organize a broad participatory process. All stakeholders have to be involved, which are relevant.

The identified thematic research areas have to be further detailed and specific research topics have to be selected. The major goal of this research priority setting is to realize, where Polish scientists and researchers have strong competences and capabilities – that means on which specific research topics are they in fact excellent. Concerning the role of Polish industry it is important to specify which industrial branches are indeed capable to transfer scientific knowledge and research into R&D, engineering and product development to enhance innovation performance.

For the identification and prioritisation of specific research topics, it will be beneficial, to divide the key-group into a number of sub-groups. With the Polish technology platforms – at least for some transport research areas – well organized strategic networks do exist, which could act as these sub-groups. There is a platform for rail transport, for road transport, for aviation and for waterborne transport.

While some of the technology platforms are driven by industrial actors like the rail technology platform, others are driven by public-private actors like the road transport platform. The technology platforms are suitable for the dialogue (maybe some further experts have to be involved as well) to identify and prioritize specific research topics and blueprint a joint transport research agenda.

However, there are important transport research areas where no strategic networks are present. Strategic network do not yet exist for automotive and automotive supply, for public transport, for sustainable mobility and for spatial planning. These strategic networks may be identified in existing Polish associations or with individual groups of experts and then involved in the further policy process.

The work in the sub-groups has to concentrate on specific science and research topics. We recommend to employ the above introduced idea of analysing the above mentioned research value chain starting from scientific research through applied research and experimental development towards engineering and product design. Several departments of Polish academies have for example excellent basic scientific research and applied research competences. So called heterogeneous micro-devices for sensor systems, laser applications for new measurement and testing equipment or multifunctional materials for vehicle components are subjects of scientific excellence and relevant for enhancing the innovative capabilities of the automotive supply industry and intelligent infrastructure applications. There are as well excellent scientific and applied research competences at universities or in RTOs, regarding simulation and modelling techniques practical for many different purposes in transport industry and transport services (e.g. for traffic simulation, logistic management and operation control as well as safe-ship simulations or simulation of track-axis interactions in the railway sector).

Experts from science and industry have to match, what competences, capabilities and capacities are at present accessible in Poland. The actual policy process involving the above mentioned strategic networks does provide a good basis to improve science-industry relations, which is a principal factor for building up a strong economy and a knowledge based society in Poland.

## **6. Future prospects**

The transport research policy strategy is emphasising on the identification of thematic transport research areas. The additional transport research policy agenda will focus on specific research topics which reflect the actual competences, capabilities and capacities of Polish transport science and research and in particular of Polish transport industry. Both exercises are the starting point, for the route towards a Polish national transport research program for the years 2007-2013.

How public funding for the considered transport research program can be allocated is still unclear and has to be talked on and negotiated throughout the next year. There are a number of options for a transport research program operation in Poland. On one hand the coordination among the Ministry of Transport and Construction and the Ministry of Science and Higher Education may lead to a funding agreement. On the other hand the program could be matched with the targets of the National Framework Programme that means the programme is used as advanced content design of the thematic area "Transport Infrastructure and Systems". A third option would be an intra-ministerial decision by the Minister of Science and Higher Education that applications for public grants which are corresponding with the prioritized transport research topics will be privileged for public grants or even more a particular budget share will be earmarked in the national grant funding system for transport science and research.

At the kick-of conference in November funding opportunities for transport science and research in Poland will be a major item. We hope that at this conference first agreements are made which are being followed soon by a political negotiation process on a public funding budget and the operation of a national transport research program for the years 2007-2013 – open for multi-national cooperation.