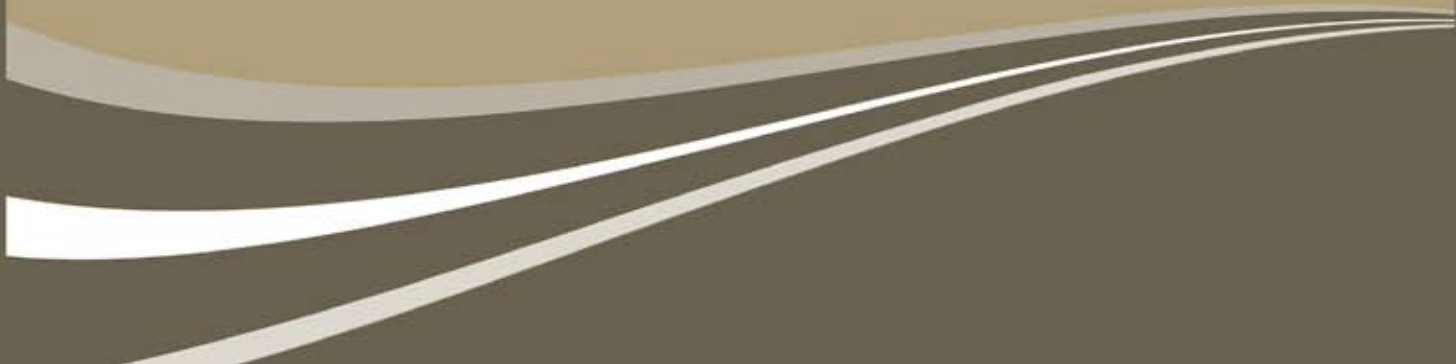




Renewal of the Road Transport Sector



with Focus on the Knowledge and Innovation Process



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Preface

The Swedish Road Administration (SRA) was commissioned by the Swedish Government in the 2005 appropriation directions to present a report by 15 October 2005 of the measures the SRA has undertaken to create a good climate of innovation and to stimulate innovation within its own activities.

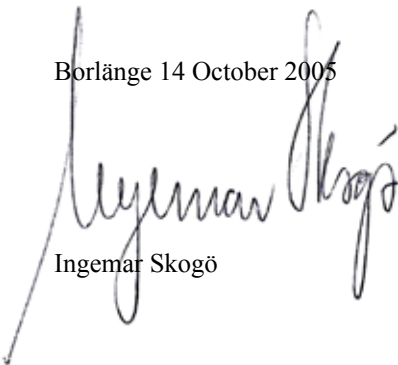
According to the appropriation directions, the report must be based on the strategy, *Innovative Sweden: A Strategy for Growth through Renewal* (Ds 2004:36).

We have interpreted the Government mandate in the light of our sectoral responsibility for the development of the entire road transport system. Therefore, our proposals encompass the road transport system in its entirety, with all of its components and activities.

This report, *Renewal of the Road Transport Sector with Focus on the Knowledge and Innovation Process*, is the SRA's presentation to the Government, in terms of the said mandate.

Borlänge 14 October 2005

Ingemar Skogö

A handwritten signature in black ink, appearing to read 'Ingemar Skogö', written over the printed name.

Contents

1. SUMMARY	7
1.1 Renewal strategy for the road transport system	7
1.2 Current work methods and collaboration	8
1.3 Attitudes and approach	8
1.4 New strategic initiatives	8
1.5 Concrete measures for the future	8
2. THE GOVERNMENT MANDATE - A MORE INNOVATIVE ROAD TRANSPORT SECTOR	9
3. BACKGROUND	10
3.1 EU strategy	10
3.2 Swedish Government strategy	11
4. SRA BASIC PREMISES	13
4.1 SRA responsibility to develop the road transport system	13
4.2 Policy goals	13
4.3 SRA customer focus – satisfying customer needs	14
4.4 The knowledge and innovation process	15
4.5 SRA – a problem holder and player with unique prerequisites	16
5. SRA ALREADY ON THE WAY – THE PRESENT SITUATION	17
5.1 The knowledge and innovation process – a task involving great and small	17
5.2 A well thought-out joint analysis model for choosing measures	17
5.3 Systematic handling of different project proposals from the surrounding world	19
5.4 Joint sectoral programme	19
5.5 Cooperation with other RD&D financiers (RD&D clients)	20
5.6 Special cooperation between SRA and Banverket	20
5.7 Establishing ‘virtual RD&D centres’	21
5.8 International RD&D standardisation work	21
5.9 New client strategy (customer/supplier strategy)	22
6. THE ROAD AHEAD - STRATEGY	23
6.1 SRA characteristics	23
6.2 Knowledge and innovation process goals	23
6.3 Main and subsidiary strategies	23
6.4 Fundamental ideas (attitudes and approaches)	25
7. WORKING METHODS WITH FOCUS ON COLLABORATION AND RENEWAL	28
8. IMPORTANT CHOICES FOR THE FUTURE – NEW INITIATIVES	29
9. REFERENCES	30

1. Summary

1.1 RENEWAL STRATEGY FOR THE ROAD TRANSPORT SYSTEM

The strategy set out in this report must result in a good climate of innovation, as well as stimulate innovation in the activities of Swedish Road Administration (SRA) and in the entire road transport system. The basis of the strategy is the seven-step knowledge and innovation process. By working according to a process, the SRA creates better potential for efficient, safe, and environmentally-sound transport for citizens and the business sector.

Goal for the SRA knowledge and innovation process:

By working together with its public and private collaborative partners, the SRA will bring about an efficient, visible and rapid rate of change in the road transport system. The work will take place with an overall view of the operations. The changes must result in the road transport system gradually becoming more efficient, safer and better adapted to the environment, and also in citizens and the business sector finding it to be so.

Main strategy:

SRA will continuously and efficiently renew the road transport system using the knowledge and innovation process as a basic premise. Therefore, various activities are given priority in order to hasten and support the critical renewal of the road transport system.

Subsidiary strategies:

- 1 All activities are based on knowledge, i.e., analysis and facts.
- 2 Commitment and participation are created amongst the different players in the road transport sector as regards research, development and demonstration (RD&D) activities, which are planned and carried out while simultaneously using expertise and creativity available in the surrounding world to its fullest potential.
- 3 The road transport system will be developed through the SRA and its collaborators applying the knowledge and innovation process with the application of competent advance planning in each phase of its primary and support processes. The results of this will be new or improved services (achievements) of use to citizens and the business community.
- 4 The road transport system will be developed in a cost-effective manner by applying the knowledge and innovation process to each part of the SRA's and its collaborators' primary and support processes, resulting in the streamlining of the activities involved by way of new and substantially improved technical aids, systems and processes.
- 5 The individual player's desire and capacity to develop and change its own activities will be promoted as this is a fundamental driving force in the knowledge and innovation process.
- 6 SRA will support various initiatives to develop fresh solutions in trade and industry if this clearly contributes towards the development of the road transport system in the desired direction. Support can be given by all means available to the SRA.

1.2 CURRENT WORK METHODS AND COLLABORATION

SRA presented its knowledge and innovation strategy to the Government in November 2003 (23). Contained in this is a systematic analysis model of the functioning of the innovation system and the need for change in the light of the future. This analysis model still functions for collaboration between the different players within and outside the SRA, and also in the entire transport system.

SRA has already established work methods and collaboration in line with the strategy presented in this report.

Examples of this are:

- Developed methodology for assessing and prioritising different project proposals.
- The initiation of a number of joint RD&D programmes within the sector.
- The customer programmes, (9) and (10), which have been presented in cooperation with representatives from the customer groups concerned.
- The establishment of "virtual RD&D centres".
- Investment in international RD&D collaboration.
- A new customer and supplier strategy.
- Developed cooperation with other R&D financiers.
- Special cooperation with Banverket (Swedish National Rail Administration).

1.3 ATTITUDES AND APPROACH

SRA will prioritise activities that hasten and support the critical renewal of the road transport system. Knowledge and cooperation will be fundamental to the activities. The driving force behind individuals and the business community will be put to use. A basic idea is that development, being an integral part of a prioritised activity, is conducted in the same way as the rest of it.

1.4 NEW STRATEGIC INITIATIVES

A number of completely new strategic initiatives will be taken:

- SRA business divisions will be used increasingly as demonstration arenas for new solutions.
- Suggestion schemes will be initiated.
- Stimulus and support will be given to ideas that originate externally and to access to risk capital.
- SRA will monitor and handle patents and other intellectual property rights systematically.
- SRA will work towards the establishment of a Swedish "Technology Transfer Centre".

1.5 CONCRETE MEASURES FOR THE FUTURE

The strategy will be made concrete in a Programme for Knowledge and Innovation within the Road Transport System.

The programme will indicate how it is anticipated that needs for change will be met.

2. The Government mandate - a more innovative road transport sector

SRA has been commissioned by the Government to present the measures being undertaken for creating a good climate of innovation and for stimulating innovation within its own operations. The basic premise is the Innovative Sweden strategy (4). The final date for submitting the report is 15 October 2005.

SRA has overall responsibility for developing the road transport system. Therefore, the strategy as commissioned by the Government was interpreted as encompassing the road transport system in its entirety, with all its components and activities.

This report, *Renewal of the Road Transport Sector with Focus on the Knowledge and Innovation Process*, is the SRA's account of its efforts. The title summarises the SRA's strategy, which is set out in Chapter 6.

3. Background

Both the European Commission and the Government emphasize the importance of putting research and development results to practical use. It is part of the Government's strategy, amongst other matters, that that public sector be used as a driving force for sustainable growth.

3.1 EU STRATEGY

The EU's Seventh Framework Programme for Research and Technical Development (1) points out that the programme is an important instrument for the EU to be able to achieve its underlying aspiration, which is that:

Europe will become the most dynamic and competitive knowledge-based economy in the world.

For this to be possible, knowledge generated through research must be further transformed into new products, processes and services. This reasoning within the European Commission (DG RTD) is illustrated in Figure 1, in which the innovation process is positioned in the very centre of the diagram.

An important new approach from the EU Commission's point of view is the following insight:

It is not enough for research to simply produce new knowledge, since this must also be transformed into new products, processes and services. These must also be put to general use; otherwise research and development activities will not contribute to the attainment of other objectives.

The European Commission, in its Seventh Framework Programme for Research and Technological Development (1), also presents the following standpoint:

Legal, financial and other devices must be mobilised in order to boost the effects of investment in research and technical development. Failing this, the implementation of different research and development results will be jeopardised and with this the desired change that these activities are expected to bring about.

It is against this background that the knowledge and innovation process becomes the focal point. See Figure 1. The European Commission calls attention to the process as a critical success factor in the report EUR 21265 (2):

According to the European Commission, the fact that the knowledge and innovation process has captivated the involvement of all stakeholders and relevant players is a crucial success factor. Therefore, the creation of joint sectoral, so-called technological platforms is important from the point of view of the EU.

A further strategic basic premise is also highlighted in this report for the EU action.

The problems and challenges Europe confronts are so complex that no player is capable of solving them alone. Therefore, it is necessary to employ a multidisciplinary approach with respect to all players and stakeholders, who should, in addition, act together and coordinate their activities on the basis of a common strategic agenda for RD&D.

3.2 SWEDISH GOVERNMENT STRATEGY

The Government emphasised the importance of also utilising the results of RD&D in a bill (3) proposed in 2000 in which the following is mentioned:

For the continuation of favourable development and strong competition it is crucial that Sweden is capable of generating and profiting by new knowledge, and that this can be transformed into structures, products, services and processes, which are put to use by trade and industry and other sectors of society. Sweden must have a strong research base and a production and service structure, which contribute to the strengthening of trade and industrial competitiveness in several areas, while at the same time being prepared to receive knowledge from the surrounding world.

The innovation process

A complex task of European calibre

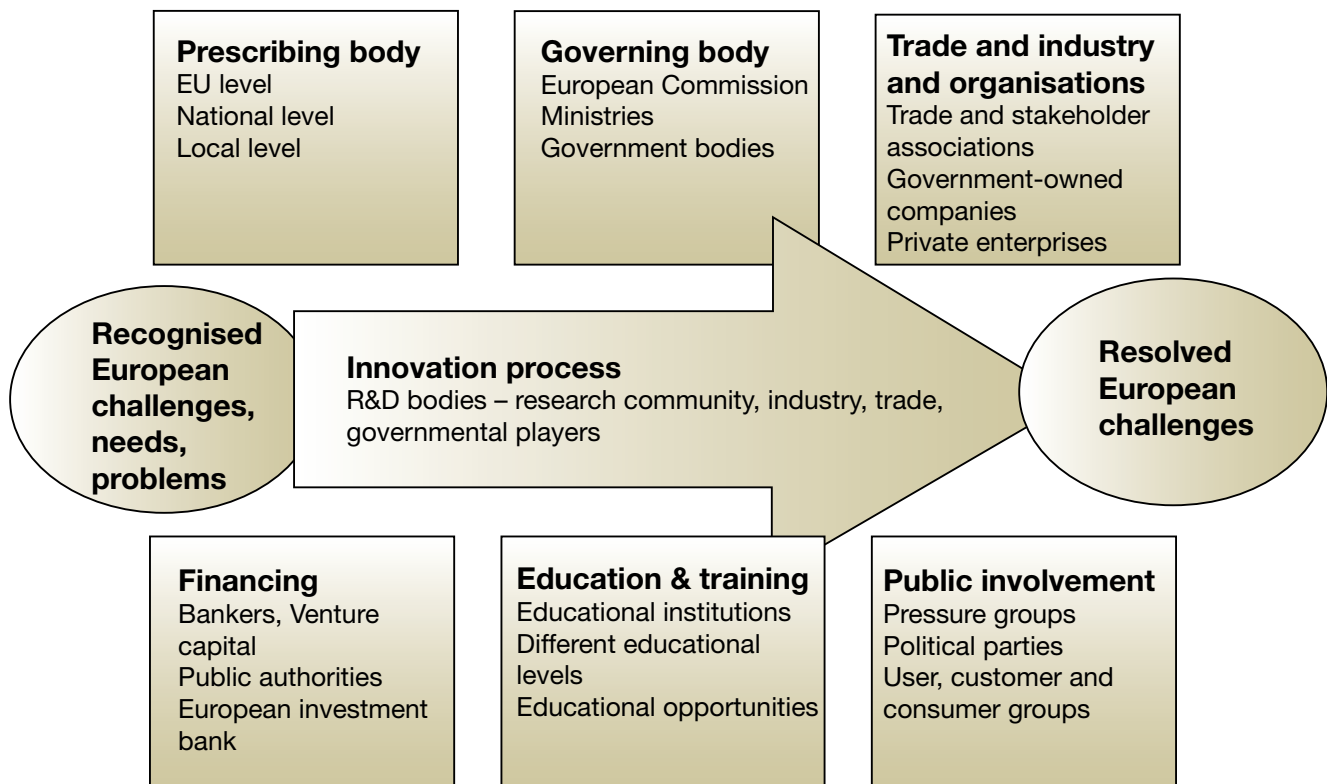


Figure 1 *The innovation process is placed in the centre (EU's view according to Horst Soboll, EC/DG RTD).*

It can be established that this view agrees with the EU's standpoint as presented on the previous page. In Sweden, the underlying and all-encompassing European ambition described in section 3.1, is downshifted nationally through the Government's having established a Swedish strategy: Innovative Sweden – A Strategy for Growth through Renewal (4).

The Swedish level of ambition in this strategy is far from modest.

The vision is for Sweden to be the most competitive, dynamic and knowledge-based economy in Europe, and thereby one of the most attractive investment countries in the world for large and small knowledge-based companies.

The following items in the Government strategy are either directly or indirectly of significance to the SRA and to the road transport sector:

- **Knowledge base for innovation**
 1. Ensuring Swedish education and research are of world class
 2. Concentrating efforts on Swedish profile areas
 3. Seizing the opportunities presented by globalisation
- **Innovative trade and industry**
 4. Strengthening the innovative capabilities of existing small and medium-size enterprises
 5. Increasing the commercialisation of research results and ideas
- **Innovative public investment**
 6. Using the public sector as an engine for sustainable growth
 7. Promoting renewal and efficiency in the public sector
 8. Developing infrastructure that promotes renewal and sustainable growth
- **Innovative people**
 9. Stimulating entrepreneurship and enterprise
 10. Making the most of people's skills

The strategy mentions that ongoing work will be made concrete in future Government Bills and in Government mandates to the relevant authorities. Appropriation directions to the authorities will presumably also contain provisos for giving substance to the activities.

4. SRA basic premises

SRA has a sectoral responsibility for the road transport system. It also has a specific responsibility to use research, development and demonstration, amongst other means, for solving road transport sector problems. While the mandate given to the SRA is based on the goals contained in transport policy, the business community's objectives should also be heeded if possible. Another obligation is to satisfy the needs of those using the road transport system, in other words individuals in society as well as trade and industry.

4.1 SRA RESPONSIBILITY TO DEVELOP THE ROAD TRANSPORT SYSTEM

SRA's overall responsibility to develop the road transport system is stipulated in Government Ordinance SFS 1997:652:

SRA is the central administrative authority with the overall responsibility, a sectoral responsibility, for the entire road transport system. SRA must ensure that the goals in transport policy are achieved. Within the framework of its sectoral responsibility, the SRA has a mobilising, supportive and motivating function in its relationships with the other players involved.

The SRA role and its RD&D responsibility become evident in what has been referred to as the Sectoral Bill (5):

The Swedish Road Administration's sectoral responsibility for the road transport system is also reflected, in principal, in its responsibility for applied research, development and demonstration activities.

Therefore, carrying out RD&D is an important way for the SRA to achieve its overall operations goals. This presupposes, however, that RD&D results will also be put to general use, which is the actual meaning of the concept "innovation". The concept and its definitions are set out in section 4.4 along with the various steps and phases of the knowledge and innovation process.

4.2 POLICY GOALS

The vision for the SRA in its endeavour to see that the road transport system develops in the desired direction, includes the goals in transport policy while taking into consideration the goals pertaining to economic policy.

The Swedish Parliament passed the *Transport Policy for Sustainable Development* Bill (6) in June 1998, which has the following goal:

The overall goal for transport policy is to safeguard the provision of socio-economically efficient and sustainable transport for citizens and the business community throughout the entire country.

This overall goal includes the following subsidiary goals:

- An accessible transport system
- High transport quality
- Safe traffic
- A sustainable environment
- Positive regional development

An additional subsidiary goal was stipulated 2001 in the Infrastructure Bill (7):

- An equal opportunities transport system

The Government Bill *Infrastructure for a Sustainable Transport System* (7) also emphasises the importance of joining forces with the business community in a joint sectoral programme. The following is mentioned in the SRA appropriation directions for 2002:

The Swedish Road Administration will work towards a combined programme of research, technical development and demonstration activities, and the introduction of new solutions that contribute towards the achievement of transport policy goals, with due regard to the goals in economic policy. The programme must be initiated within the framework of the Swedish Road Administration's sectoral responsibility, in consultation with the relevant players, and should be carried out in collaboration with the business community. The solutions presented in the programme should be designed to reach a wide spectrum of the market.

This means also paying attention to the applicable economic policy goal, which runs as follows according in the Budget Bill (8):

The economic policy goal is to promote sustainable economic growth and increased employment through a greater number of prospering enterprises.

4.3 SRA CUSTOMER FOCUS – SATISFYING CUSTOMER NEEDS

The SRA vision is as follows:

We make the good journey possible.

The vision must always be connected to its basic mission:

Focusing on people, the SRA creates opportunities for efficient, safe and environmentally-sound transport for individuals and the business community.

The good journey assumes that one aims at all the subsidiary goal in transport policy as these denote the quality of the journey. This also presupposes that there is cooperation with other players and dialogue with citizens and the business community.

Since the beginning of 2003, the SRA has intensified and broadened its contact with citizens and the business community. In collaboration with their representatives, the SRA has also drawn up a basis for describing the current needs the road transport system must satisfy. This has now been worked on and weighed up in conjunction with the goals in transport policy.

SRA has collected the conclusions reached in these discussions into two customer programmes, one aimed at individuals and the other at the business community.

Customer Programme – Citizen’s Travel (9) and Customer Programme – Commercial Transport (10) present a composite picture of the most important needs, demands and expectations that apply to the Swedish road transport system. Therefore, these programmes are important basic premises for the continued advancement of the SRA’s customer orientation, both in respect of discussions with various players in the surrounding world and within the SRA.

4.4 THE KNOWLEDGE AND INNOVATION PROCESS

The basis for the entire knowledge and innovation process is having access to expertise to be able to handle this in all stages or steps. Therefore, it is most important that the road transport sector has access to universities, institutes of technology and research institutes with a sufficiently high level of expertise. These should be in a position to carry out both basic and research education and to undertake RD&D assignments.

The knowledge and innovation process consists of the following steps:

- 1 **Business intelligence:** creating access to already known knowledge and solutions
- 2 **Research:** generating new knowledge that has not yet been discovered
- 3 **Arriving at new ideas:** jump-starting an idea in order to reach a new solution
- 4 **Development:** using ideas for producing new solutions
- 5 **Demonstration:** making the development results (the new solution) visible with a prototype
- 6 **Carrying out (implementation):** taking the necessary steps in all categories for putting the new solution to general use
- 7 **Innovation:** putting the new solution to general use, i.e., creating renewal

The knowledge and innovation process can also be divided into two main phases:

- The knowledge phase, steps 1–2.
- The innovation phase, steps 3–7.

The most important step is ensuring that research results are made use of in subsequent development and demonstration activities, culminating in the development result being put to general use. The necessary conditions for this are created when the knowledge and innovation process is the focal point. SRA has unique prerequisites to be able to manage this (See section 4.5).

The knowledge and innovation process can be considered complete only once a development result in the form of a product or service is put to general use, i.e., when a “new idea has gained a foothold in society and is disseminated”. Only then has innovation and renewal been achieved.

An idea can be generated without prior research. However, it is necessary to have access to relevant knowledge in order to be able to evaluate the development potential of different ideas and use them to their fullest potential.

Note that an idea in the form of an invention is not synonymous with innovation.

4.5 SRA – A PROBLEM HOLDER AND PLAYER WITH UNIQUE PREREQUISITES

SRA satisfies all the formal prerequisites for putting an approach into practice focusing on the innovation process in order to bring about renewal both in the road transport system and in the SRA's own activities.

A problem holder

SRA, as an authority with sectoral responsibility, takes on the problems within the road transport sector.

Therefore, the SRA has good prerequisites for being able to define RD&D needs, based on demands for renewal and change in the road transport system (external efficiency). SRA also measures up to formulating the need to streamline its own activities (internal efficiency).

This means that the SRA's role differs from that of VINNOVA, for example, and most other research financiers (clients) within the road transport sector.

Internal and external efficiency

New or substantially improved products and services of use to the SRA's customers, i.e., citizens and the business community that exist in the road transport system can result in an increase in external efficiency.

A good product or service contributes in a marked way to the fulfilment of the goals in transport policy or customer satisfaction. In order to know how satisfactory a product or service is, knowledge is often demanded in the form of "cause and effect", which results in a significant need for research. The same applies to the question of finding the optimal product assembly and range of services.

Internal efficiency can increase through new or substantially improved technical aids, systems and processes, which streamline one's own operations.

Streamlining different operations means reducing the costs involved in supplying a certain product or service of the desired quality, "service undertakings" in respect of the surrounding world.

The results must be put to use

In order for investments in RD&D to yield returns and not only generate costs, the results must be utilised in the operations.

Therefore, one should always ask oneself whether one may, one wants to and one is able to actually utilise the RD&D result.

SRA, in its own operations, has access to many tools, such as regulations, procurement documents, information campaigns, etc., for enabling new solutions to be put to general use.

5. SRA already on the way – the present situation

SRA has already taken a number of steps on the way to creating conditions for improving the road transport system. The handling of projects has been systematized and collaboration is carried out both at a national and an international level.

5.1 THE KNOWLEDGE AND INNOVATION PROCESS – A TASK INVOLVING GREAT AND SMALL

SRA realised the importance of working in a climate of knowledge and innovation several years ago. What is needed now is dynamic insight into the SRA's task of improving and renewing the road transport system, together with the involvement of people in SRA activities on all levels, both great and small. It is also important to spread involvement to our collaborative partners and customers, i.e., citizens and the business community.

This was the basic premise behind the formulation of the SRA vision, mission and characteristics. (See section 4.3 and 6.1) These accentuate that the SRA is part of a much larger system, which can contribute to making "the good journey possible". SRA's role is that of the "engine" in the system.

This becomes clear on another level in that citizens and the business community are defined as SRA customers while its central task is defined as "supporting citizen's journeys" and "giving support to the business community".

This customer orientation has resulted in the SRA intensifying its dialogue with the surrounding world. There is a great deal of proof that this too yields results. An example of this are the customer programmes (9) and (10), mentioned in section 4.3.

5.2 A WELL THOUGHT-OUT JOINT ANALYSIS MODEL FOR CHOOSING MEASURES

In November 2003, the SRA presented the Government with a knowledge and innovation strategy (23). This contains a model for systematically analysing the function and needs of the innovation system for the future.

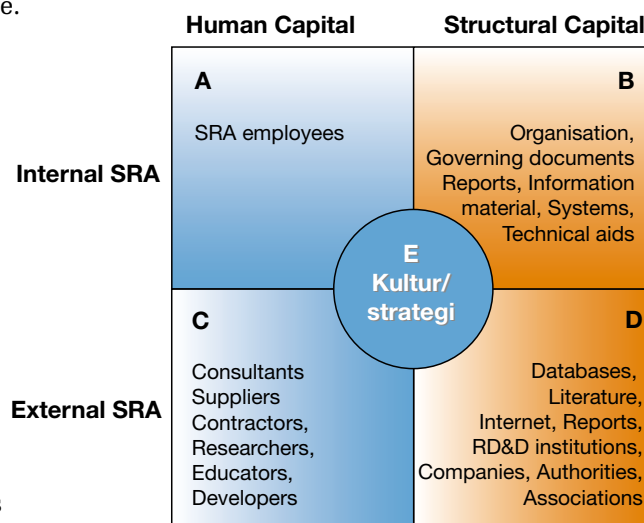


Figure 2
Various components
of the innovation system.

This analysis model still applies for collaboration between the various players in the road transport sector, both within and outside the SRA. The model will therefore be used to a greater extent than before for activities affected by the knowledge and innovation process.

This joint analysis model will enable different activities, including collaboration with various players in the surrounding world, to develop on the basis of integrated and systematic analyses carried out at the SRA.

The following definition, which agrees with that of the OECD, is a basic premise for this analysis model:

The innovation system is a network of public and private institutions in which knowledge is produced, spread and used.

This means that the need for and utilisation of knowledge, i.e., the knowledge and innovation process, both presently and in the future, must be dealt with from a systems perspective.

Figure 2 shows who has the knowledge and expertise necessary for providing the road transport sector with knowledge and relevant innovations. The relationships between the different squares in the figure may vary depending on the traditions (culture) or conscious choices (strategy) of the SRA and other players.

Relation Connection

- A - C Large in-house human resources with limited use of consultants, or vice versa.
- A - B Relatively low expertise and experience amongst one's own employees results in a need for access to large structural capital as backing. High expertise in-house means less dependency on structural capital.
- B - D Access to external structural capital can be a deciding factor in whether one needs to build up an in-house structure or not.
- C - D Engaging consultants, etc, often means that one also has access to their structural capital. Procurement methods are important for the type of development and the development of expertise stimulated externally.
- B - C SRA's structural capital can control contractors and consultants through regulations, standards and manuals, which illustrate a "framework" in a wider sense.
- A - D It is very important for one's own employees to have access to the knowledge and experience of others.

The knowledge and innovation strategy presented in this report is considered to shed light both on relations (E) between the different sections (A-D) and within individual sections.

SRA uses the analysis model as an important basic premise for screening different activities and in the choice of approach and interaction with the surrounding world. Such considerations are fundamental to the formulation of the Programme for Knowledge and Innovation within the Road Transport System, which is described in Chapter 7.

5.3 SYSTEMATIC HANDLING OF DIFFERENT PROJECT PROPOSALS FROM THE SURROUNDING WORLD

SRA wants to facilitate taking advantage of the expertise and creativity existing in the surrounding world. For this reason, the SRA has a carefully-prepared method for dealing with RD&D project proposals it receives from the surrounding world.

The need for RD&D is published on the SRA's website for RD&D and standardisation activities where there also are application forms for those who wish to register project proposals. It is therefore both easy and convenient for the surrounding world to submit proposals for various types to the SRA.

Project proposals are prioritised and then evaluated in accordance with the defined criteria as set out in *RD&D programme 2004 - 2013* (20).

5.4 JOINT SECTORAL PROGRAMME

The Infrastructure Bill (7) makes reference to the following wording in the SRA's 2002 appropriation directions:

The Swedish Road Administration will work towards a combined programme of research, technical development and demonstration activities, and the introduction of new solutions that contribute towards the achievement of transport policy goals, with due regard to the goals in economic policy. The programme must be initiated within the framework of the Swedish Road Administration's sectoral responsibility, in consultation with the relevant players, and should be carried out in collaboration with the business community. The solutions presented in the programme should be designed to reach a wide spectrum of the market.

These appropriation directions later resulted in agreements that concern two separate joint RD&D sectoral programmes concerning vehicles: the Emissions Research Programme (EMFO), and Intelligent Vehicle Safety Systems (IVSS).

These and subsequent agreements within the sector have been facilitated by the coinciding interests between the goals in transport, economic and commercial policy. Cooperation can also occur with non-commercial stakeholders for example, other public authorities, municipalities, county councils, and transport authorities.

Investment in joint sectoral programmes is completely in line with the EU's reasoning as presented in the Seventh Framework Programme for Technical Research and Development (1).

On-going and planned joint sectoral programmes

- *The EMFO programme covers emissions that occur in connection with vehicles using public roads as well as emissions from tractors and larger work machinery. Also included in this programme are exhaust fumes, vaporization, and emissions that occur as a result of the interaction between roads and vehicles.*

- *The IVSS programme* aims at creating conditions for and introducing new in-vehicle technology that promotes road safety and that is adapted to human needs and capabilities as well as to the relevant systems and the road infrastructure.
- *Renewal in the construction sector (FIA)* is a collaborative effort within the construction industry that concerns road and rail infrastructure, and which was jointly established by Banverket and the SRA.
- *The car's social and economic importance* is an agreement concerning a joint research programme between the SRA, Statens Vegvesen (Norway), and VINNOVA, et al.
- Dialogue is in progress with the *Swedish Association of Local Authorities and Regions* concerning the intensification of RD&D cooperation, which is scheduled to begin at the turn of the year 2005/2006.
- A joint research programme on *Risk assessment in social planning – with applications in transport and transport infrastructure* will be initiated in 2006, with the Swedish Rescue Services Agency (SRSA) as principal. SRA and several other authorities will participate in this programme.

5.5 COOPERATION WITH OTHER RD&D FINANCIERS (RD&D CLIENTS)

VINNOVA, in accordance with a Government mandate, has presented a national strategy for transport-related RD&D (24) in cooperation with Banverket; the Swedish Energy Agency; FAS; Swedish Research Council for Environment; Agricultural Sciences and Spatial Planning (FORMAS); the Swedish Environmental Protection Agency; and the SRA. This strategy was presented to the Government in May 2005.

Banverket, The Swedish Energy Agency, Swedish Environmental Protection Agency and the SRA have supported this strategy in a written statement.

The strategy emphasises, above all, the need to use resource-efficient, targeted efforts; to invest in strong research environments and to increase the long-term effects of investments; and similarly, to cooperate with and clearly divide responsibility between state research financiers (clients).

A consultation group has been established on the initiative of VINNOVA, for initiating and financing RD&D activities in the transport area. This strategy (24), which was presented to the Government in May 2004, points out the significance of cooperation for coordinating and organising the authorities' various activities. The various research-funded authorities in the transport sector participate in this consultation group, created for this purpose and referred to as the TRANSAM Group.

5.6 SPECIAL COOPERATION BETWEEN SRA AND BANVERKET

In many respects, the SRA and Banverket have similar duties, especially as far as RD&D is concerned. For this reason, the Programme for Development of Cooperation between Banverket and the SRA was established in September 2003.

RD&D is one of 13 collaborative areas mentioned in the programme.

5.7 ESTABLISHING 'VIRTUAL RD&D CENTRES'

Access to important RD&D environments is a prerequisite for carrying out RD&D activities.

SRA's work method for achieving this is by using a 'virtual RD&D centre' in which the various RD&D bodies collaborate. The model is described in the Nordic Road Association (NRF) report, *Den svenska vägtransportsektorns FoU-behov och tillgång till FoU-utförare med tillhörande utbildningsutbud* [The Swedish Road Transport Sector's R&D Needs and Access to R&D Bodies and Educational Institutes] (25).

SRA signs far-reaching cooperation agreements with guaranteed order volumes with RD&D bodies that collaborate in well-functioning virtual RD&D centres. These agreements enable RD&D bodies to carry out their work in stable and predictable planning conditions. These agreements have a time span of 5-6 years, but can be extended if the cooperation works out well.

Four virtual RD&D centres were formally established in August 2005:

- Virtual RD&D Centre for Bridges and Tunnels (FUD-BT)
- Centre for a Sustainable Road Transport System (CELEST)
- Transport telematics R&D group Sweden (VFUDC-TTS)
- Swedish intermodal transport research centre (Sir-C)

An additional virtual centre for road technology will be established in autumn 2005.

SRA also intends initiating the establishment of a virtual RD&D centre covering road planning expertise or road design in a broader sense.

5.8 INTERNATIONAL RD&D AND STANDARDISATION WORK

SRA's international RD&D programme was established in November 2004 (14). SRA's strong commitment to both Nordic and European RD&D collaboration is evident in the programme.

In autumn 2004, European road authorities applied to the European Commission (DG RTD) for a financial grant for developing and strengthening European RD&D collaboration. The initiative for this was taken within CEDR (Conference of European Directors of Roads) (SG Road Research). The result of this application was the joint project ERA-NET ROAD – *Coordination and Implementation of Road Research in Europe*.

In this project, the SRA is to manage the work carried out in strategic work packages WP 5 and WP6, and must also be prepared to participate in WP2, WP3, WP4 and WP7. See Figure 3 on the following page. Collaboration is conducted and coordinated by England's road authority, Highways Agency (WP1).

The road authorities of Sweden, Denmark, Finland, Iceland and Norway have collaborated for many years. However, Nordic collaboration has taken on a more formal character since 2003. A number of areas for Nordic RD&D cooperation have been identified jointly. A management body and a reviewing panel have been set up for organising current and future collaboration.

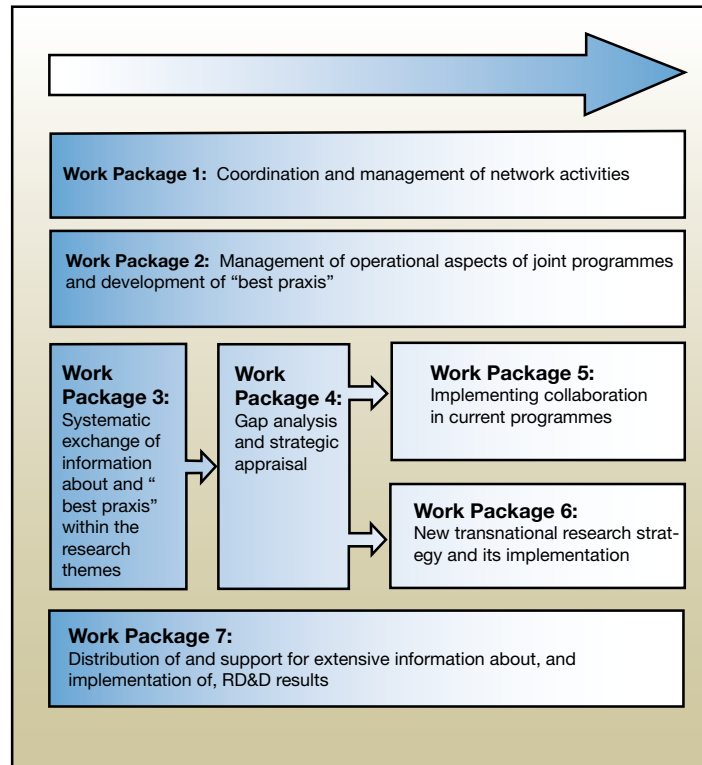


Figure 3
Relationship between various "Work Packages" in the ERA-NET Road Project.

Gaining access to knowledge available in and concerning the surrounding world is made possible through participation in international expert networks that are involved in standardisation activities. Perhaps even more important is accepting the international standards presented as a means of profiting by the knowledge and experience of others without having to carry out corresponding RD&D activities or repeat others' mistakes.

This clear connection between standardisation activities and the knowledge and innovation process is one of the key basic premises in the SRA's orientation document, published in November 2004 (21). This document presents the arguments and work methods that are guidelines for the SRA's involvement in both national and international standardisation aimed at more efficient goal fulfilment within the activities concerned.

5.9 NEW CLIENT STRATEGY (CUSTOMER/SUPPLIER STRATEGY)

SRA, as one of the largest clients in the construction field, is a key player as concerns fulfilling the need in society and on the part of customers for a cost-effective implementation of road management.

During 2005, the SRA drew up a new client strategy, its customer/supplier strategy (26), which covers construction, maintenance and operation, and ferry operations.

The strategy emphasises that the SRA, with its available resources, "must do things the right way" and that its choice of procurement method will make it possible to achieve the proper quality at the lowest socio-economic cost.

Carrying out a strategy requires well-developed cooperation with all contractors and suppliers, who participate in innovative, trusting and instructive collaboration.

6. The road ahead – strategy

The knowledge and innovation strategy implies that the SRA prioritises activities that hasten and support the critical renewal of the road transport system. Activities must be based on knowledge and cooperation. The driving forces in individuals and the business community must be used. A basic idea is for development to be a natural part of the prioritised activity and conducted in the same way as the rest of it.

6.1 SRA CHARACTERISTICS

SRA's vision (see section 4.3) has been expanded to include the following characteristics:

- reliable
- open
- creative community builder

Both volition and ability are necessary for adapting the SRA's various activities according to its vision and characteristic. Therefore, the following catchwords have been chosen for the SRA's constant work for change:

- customer focus
- overall perspective
- efficiency

These catchwords and characteristics are also basic premises points for the way that the SRA ought to work for the renewal of the transport system:

It is through the innovation process that the SRA constantly creates better potential for efficient, safe and environmentally-sound transport for citizens and the business community.

6.2 KNOWLEDGE AND INNOVATION PROCESS GOALS

The goal for the SRA knowledge and innovation process is:

By working together with its public and private collaborative partners, the SRA will bring about an efficient, visible and rapid rate of change in the road transport system. The work will take place with an overall view of the operations. The changes must result in the road transport system gradually becoming more efficient, safer and better adapted to the environment, and also in citizens and the business sector finding it to be so.

6.3 MAIN AND SUBSIDIARY STRATEGIES

Main strategy

The goal for the knowledge and innovation process is the basic premise behind the main strategy, which is in line with the basic approach of both the EU and the Swedish Government.

SRA will continuously and efficiently renew the road transport system using the knowledge and innovation process as a basic premise. Therefore, various activities are given priority in order to hasten and support the critical renewal of the road transport system.

In view of this main strategy, the SRA lives up to the epithet, "creative community builder".

Subsidiary strategies

The first three subsidiary strategies reflect the characteristics: **reliable, open and creative community builder**:

1. All activities are based on knowledge, i.e., analysis and facts.
2. Commitment and participation are created amongst the different players in the road transport sector as regards research, development and demonstration (RD&D) activities, which are planned and carried out while simultaneously using expertise and creativity available in the surrounding world to its fullest potential.
3. The road transport system will be developed through the SRA and its collaborators applying the knowledge and innovation process with the application of competent advance planning in each phase of its primary and support processes. The results of this will be new or improved services (achievements) of use to citizens and the business community.

SRA's purpose is to renew the road transport system in a cost-effective way, as reflected in the fourth subsidiary strategy.

- 4 The road transport system will be developed in a cost-effective manner by applying the knowledge and innovation process to each part of the SRA's and its collaborators' primary and support processes, resulting in the streamlining of the activities involved by way of new and substantially improved technical aids, systems and processes.

The fifth subsidiary strategy highlights the importance of the individual, which is also a central basic premise in the committee report on innovation processes (11).

5. The individual player's desire and capacity to develop and change its own activities will be promoted as this is a fundamental driving force in the knowledge and innovation process.

In its report *Säker trafik för goda affärer* [Safe Traffic for Good Business] (12), NUTEK presents a strategy for enabling Sweden's good reputation in the field of road safety and in the work on road traffic to generate a great many business opportunities and increased competitiveness for Swedish companies.

In the sixth subsidiary strategy, this approach is expanded upon to include all goals in transport policy and the SRA's attempts to increase the level of customer satisfaction. The subsidiary strategy also focuses on business community goals. Thus, the focus in the sixth subsidiary strategy is on interaction between public and private activities. This is a challenge for both public and private organisations in the road transport sector.

6. SRA will support various initiatives to develop fresh solutions in trade and industry if this clearly contributes towards the development of the road transport system in the desired direction. Support can be given by all means available to the SRA.

When the SRA applies the main and subsidiary strategies, acceptance of the attitudes and approaches presented in section 6.4 is necessary. The consequence of this is that daily work methods must be re-examined and renewed. See Chapter 7 and 8.

6.4 FUNDAMENTAL IDEAS (ATTITUDES AND APPROACHES)

In February 2003, the SRA laid down the basic premises for prioritising and conducting RD&D activities for the future. The following basic idea was amongst the basic premises established:

Development (i.e. RD&D and its implementation) is an integral and important part of an activity and is therefore prioritised and conducted in the same way as the rest of it.

Today, this basic idea is of even greater relevance with the innovation process as the focal point, as is presented in the main strategy in section 6.3 and indirectly illustrated in Figure 1. This main strategy also requires a very clear and pronounced attitude to the knowledge and innovation process, which places it in an especially elevated position.

In a practical sense, the main strategy requires the following all-embracing and important approach:

Eliminating obstructions to new solutions

SRA's 'toolbox' functions to promote the introduction of new solutions not counteract them. Applicable regulations and standards can sometimes be obstructions to new solutions.

- SRA should as far as possible work towards formulating laws, ordinances and regulations in such a way that their enforcement allows room for the introduction of new solutions.

Promoting critical thinking and using experts

- That all activities need to be knowledge-based i.e., an analysis of facts, implies the necessity to promote a developed, systematic and critical thinking mode, based on solid knowledge and reliable experience.

This is a requisite for a dynamic environment open to development. It is possible to see a trend to consciously increase the recruitment of people with research training in the private sector. The reason is to make use of their special skills at formulating and analysing problems for finding optimal solutions to problems. There is also a need at the SRA to substantially increase the percentage of employees with research education. This, in turn, reinforces the need for creating careers as specialists or experts in a field.

- Department heads and employees should regard the knowledge and the experience of experts with humility and respect, and should capture and reward their ideas on new solutions in the relevant activities.

It is also important to strengthen cooperation with universities and institutes of technology to enable SRA personnel to study further towards a licentiate or doctoral degree. Personnel with bachelor's degrees should be given the opportunity to study towards a master's degree.

In return, SRA expertise would benefit the academic world, in part, by using SRA experts and specialists as teachers. This applies to all levels of education, i.e., basic and research education, as well as continued and further education. Therefore, the conclusion in sum is to:

- Strengthen and intensify collaboration with universities and institutes of technology.

The main reason for this commitment is, however, to increase the potential for universities and institutes of technology to educate personnel who can fulfil a future demand for expertise within the road transport sector.

Acting jointly and internationally

The desire to create involvement and participation amongst the different players within the road transport sector and the need for the road transport system to develop using skilful advance planning requires a similar attitude to that of the EU.

- The problems and challenges that Sweden and the rest of Europe face are so complex that no player is capable of solving them alone. Therefore, a multidisciplinary approach is necessary involving all players and stakeholders. In addition, everyone must work together at coordinating their actions, with a common view of the importance of RD&D.

SRA's commitment so far to the joint sectoral programme is completely in keeping with this attitude.

This conclusion can be formulated as a more general basic idea.

- Conducting research and development activities in the form of joint sectoral programmes implies that the relevant stakeholders are collectively engaged, thus creating the conditions for a multidisciplinary approach. This means that combined and coordinated action takes place at the same time based on joint research and development needs.

A further important basic premise lies in the fact that Europe's problems are no different from those faced by Sweden.

- Problems and challenges in the future road transport system in most cases are not unique to Sweden, and therefore neither are the solutions that are needed.

This was the most important basic premise in the formulation of the SRA's programme for international RD&D activities, *Program för Vägverkets internationella FUD-verksamhet* (14). Presented in this programme are the reasons and basic premises that are guidelines for SRA's participation in international RD&D activities, especially as far as Nordic and European collaboration is concerned. The following standpoint is stated in the preface to the abovementioned programme, which in itself implies a general attitude to international collaboration:

- The SRA should act and work on an international scale in more areas of activity than at present. This is a strategic consideration in light of the future. In this regard, RD&D activity can be both a forerunner and an example.

Stimulating the innovation process in the surrounding world

In order to promote collaboration with private enterprise alongside various joint sectoral programmes, support and stimulation of the innovation process on the part of private enterprise must also be developed.

- Potential for synergy between transport policy and economic policy aspirations must be taken advantage of, especially if this promotes export, and with this, increased employment and growth in Sweden.

All ideas originate in some individual. It is therefore important that the surrounding world has access to knowledge concerning the problems and challenges facing the road transport sector. It is in this area that the SRA, with its overall responsibility for the development of the road transport sector, has an important task.

- The surrounding world needs to be kept informed in an easily understood and suitable way of the problems and challenges facing the road transport sector as well as the changes that need to be made. In this way, work with ideas can be directed towards the needs in the road transport sector.

If one compares the construction industry with other sectors in society, the message is fairly clear.

- Competent and demanding clients are the most efficient driving force behind the business community's investments in research and development.

This conclusion can be gathered from two VINNOVA reports (16) and (17).

Working towards harmonisation and standardisation

A report (18) issued by The Swedish Institute for Growth Policy Studies (ITPS) highlights the strategic importance of issues relating to procurements. This report introduces measures for facilitating the participation of small and medium-sized enterprises in public procurements. Out of the measures suggested, the SRA should accept that:

- Common standards and instruments promote the correct, consistent and predictable application of public procurement regulations (with the same conditions applying to competition).

The importance of increased competition is stressed in the report *Skärpning gubbar!* [Sharpen up, guys!] (19), which targets all the relevant players in the building and construction industry with a description of problems encountered. One of the most serious problems pointed out in the report was insufficient competition.

Another reason for the SRA becoming involved in work with international harmonised standards and regulations is that:

- SRA's involvement in the international harmonisation of regulations and standards could positively affect them by assisting Swedish enterprises in selling their products and services on the export market.

Countries that do not have their own national standards in different areas often use European "EN standards". These have now become a more globally accepted alternative to the American ASTM or German DIN standards.

7. Working methods with focus on collaboration and renewal

A number of planned measures will strengthen the direction in which the renewal of the road transport system moves

- The two primary processes at Head Office have been amalgamated and shared between a department that works with product and service development (external efficiency) issues and another that works with implementation issues, i.e., activity streamlining (internal efficiency). With this, the SRA will prioritise its duty to promote the necessary product and service development within the road transport sector.
- In future, the Strategic plan for the SRA for 2005 -2014 (13) will function as RD&D – a plan at a strategic level, just as the strategic plan is a plan for other activities at a strategic level.
- The RD&D Programme 2004-2013 (20) will be revised, with the strategic considerations as set out in this report as the basic premises. At the same time, the programme will be broadened to cover the entire activity field encompassed by this strategic document. The revised programme will be called *Program för kunskap och innovation inom vägtransport-sektorn* [Programme for Knowledge and Innovation within the Road Transport Sector]. In this, the necessary measures leading up to this strategic document will be presented, as well as the indicators and result parameters that make it possible to monitor the measures.
- Roles and responsibility within the knowledge and innovation process will be described in the programme. This will help external collaborative partners to both find and grasp the appropriate information in the SRA organisation. This is expected to contribute to increased legitimacy for the SRA as an RD&D client.
- The programme *Program för Vägverkets internationella FUD-verksamhet* [Programme for SRA's international RD&D activities](14) will apply as a supplement to the Programme for Knowledge and Innovation within the Road Transport Sector.
- The report, *Inriktningen av Vägverkets standardiseringsverksamhet* [Orientation of SRA Standardisation Activities] (21) will also apply as a supplement to the Programme for Knowledge and Innovation in the Road Transport Sector.

8. Important choices for the future – new initiatives

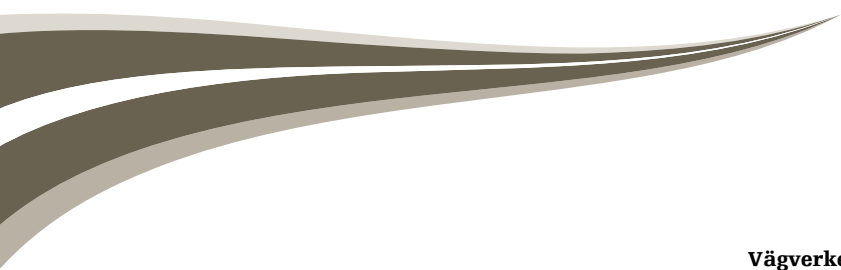
Aside from the measures already planned (see chapter 7), the SRA will also take the following initiatives.

- SRA business divisions will be used as arenas for demonstrating new solutions. Therefore, the business division goals, strategies and valuations (15) established in 2003, need to be complemented with the role of these divisions as demonstration arenas.
- Activities concerning proposals need to be dealt with more systematically. This applies both to capturing the ideas of employees and rewarding them in suitable ways. Clear and continuous feedback from SRA top management is also important in this context.
- External ideas that come up require support and stimulation, as well as suitable access to risk capital. Therefore, the SRA will keep the surrounding world informed about the problems and challenges that exist in the light of the future. SRA will also be available to give a professional and reliable opinion as to how various ideas contribute towards solving future foreseen problems while at the same time stating whether or not a particular solution is worthy of further development. This will increase the potential for those companies presenting solutions to obtain suitable development funding in the business community. SRA can also, if necessary, make a commitment to endeavour to have regulations and standards modified, which is indirect backing for market introductions.
- A special unit has been set up at the SRA, with the task of working on the systematic monitoring of patents. This is partially to capture interesting ideas and partially to be able to provide information when situations occur involving intellectual property rights in SRA matters.
- New solutions and already existing or anticipated RD&D results must be captured. For this reason, the SRA will work towards the Library and Information Centre (BIC) at VTI (Swedish Road and Transport Research Institute) taking on a similar role and tasks modelled on the American "Technology Transfer Center".

The basic premise for the latter is the recently completed inquiry, *Transportforskningens framtida informationsförsörjning - TRANSIF 2005 – Slutrapport* [Future Information Provision for Transport Research – TRANSIF 2005 – Final report] (22).

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