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ADMINISTRATION

# Finnish Road Administration

Research and Development Strategy, 2002 - 2007

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TIEHALLINTO

Kirjasto

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## **FINNISH ROAD ADMINISTRATION RESEARCH AND DEVELOPMENT STRATEGY, 2002 -2007**

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Following the separation of the activities of the former Finnish National Road Administration into a state agency, the Finnish Road Administration (Finnra) and a state-owned enterprise, the Finnish Road Enterprise, a new Finnra Research and Development Strategy was prepared for the years 2002-2007.

The basic building-blocks of this strategy are the Finnra mission, values, and the agency's new vision. The objective of R & D activities within Finnra is to create new information and know-how such that the Finnish transport system can operate more efficiently, more safely, and more competitively, based on principles of sustainable development.

The following focal points have been outlined for research and development as areas of special emphasis:

1. Requirements of road users and other client groups
2. Impacts of road management and traffic
3. Asset management
4. Working markets for procurement of road works and services
5. Traffic management
6. Management of traffic and road network information

R & D activities will be prioritised on these focal areas. Since the Finnish Road Administration also carries a sector responsibility in respect of products and services relating to the public road network, i.e. in the form of issuing instructions, norms, and the like, its R& D activities are also directed in part to these tasks.

This research and development strategy was adopted by the Board of the Finnish Road Administration on February 26, 2002.

Both the Finnra R & D strategy and the research programme can be found from the Administration's internet pages ([www.tiehallinto.fi](http://www.tiehallinto.fi), in Finnish and in English).

Finnish Road Administration

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## FOREWORD

In December 2000, at the time of the division of the former Finnish National Road Administration into the Finnish Road Administration (Finnra) and the Finnish Road Enterprise, the Finnra Management Committee approved the principles for the simultaneous division of research and development activities. With the new role granted to Finnra, the old R & D strategic guidelines - adopted in 1999 and encompassing the period from 2000-2003 - lost some of their relevance.

In the course of 2001 a new mission and vision were drafted for Finnra, and these have set the framework for the new research and development strategy. On the basis of this the following topics were singled out as the main areas of focus in R & D operations:

1. Requirements of road users and other client groups
2. Impacts of road management and traffic
3. Asset management
4. Working markets for procurement of road works and services
5. Traffic management
6. Management of traffic and road network information

To support programming, the R & D work carried out to date was examined by an external analyst provided by the National Technology Agency (TEKES) in the spring of 2001. The basic principles and the progress of preparations have been dealt with in three Finnra management seminars. In the wake of the changes in the Road Administration organisation, the principles governing the supervision of R & D operations have also been adjusted.

The research and development strategy to be followed by Finnra has been prepared by a task force chaired by Director Aulis Nironen, and the members were Tiina Korte (Ministry of Transport and Communications), Regional Road Director Pekka Jokela, Directors Eeva Linkama and Markku Teppo, Research Director Jukka Isotalo, Deputy Director Pauli Velhonoja, and Research Coordinator Pekka Korhonen.





## 1 FINNRA'S R & D ACTIVITIES

As the largest agency charged with maintaining Finland's public infrastructure, and through its role in the development of the nation's road transport system as a whole, the Finnish Road Administration has an increasingly clear responsibility for the upkeep and further development of road & traffic technology and expertise. The aim in Finnra's R & D operations is to create new information and know-how, with a view to ensuring that the entire transport system will operate effectively, more competitively, and more safely in an environmentally sustainable manner.

R & D activities are geared towards applied research providing data and results that benefit development of the road transport system and road management, and also the development and implementation of guidelines, functional quality criteria, and other methodology needed for road management and operations. The work comprises strategic projects, development projects related to the services of the core processes, and general operations supporting Finnra's broader role in the transport sector.

The Road Administration's new role from 2001 requires closer cooperation with the Ministry of Transport and Communications and its subsidiary agencies, alongside networking with other actors in the transport field.

## 2 BASIC PRINCIPLES

**The mission of the Finnish Road Administration:** Finnra is responsible for the public roads and highways of Finland, offering its clients efficient, safe, and environmentally sound road services for the movement of people and goods, in collaboration with other stakeholders in the transport sector.

**The Act on the Finnish Road Administration:** Under the terms of the Act, Finnra is required to oversee the upkeep of research & development and expert services for the road transport system.

**Statute on the Finnish Road Administration:** Finnra shall monitor and promote the development in its branch, implement research and development operations to this end, and take part in international cooperation in the field.

**The Public Road Act (117§):** Finnra shall provide technical guidelines on the making and maintenance of roads and highways.

**The Finnra vision** or operating principle, which provides the cornerstone for R & D strategy, can be divided into four distinct areas:

***Working from the needs of society:*** This requires new information on the changing societal requirements and an ability to analyse the significance of these needs for road management and transport, at the same time as recognising the impact of Finnra's measures on them.

***Working in partnership for the good of the traffic system:*** This requires the input of new information on trip and transport chains. On the research front it requires networking with other forms of transport, with other research organisations in the branch, and with other research fields. The Finnra vision stresses a sense of initiative in the forging of research networks.

***Fulfilling our responsibilities as a centre of expertise in road management:*** This requires a commitment to research and development work on road management, in the development of road management projects, and in the realm of information management.

***Creating a challenging working community:*** This calls for an atmosphere in which it is possible to develop, produce new ideas, and maintain motivation in order to further road management and mobility.

**Other principles** underlying the R & D strategy include the Ministry of Transport and Communications programme "Towards Intelligent and Sustainable Transport 2025", Finnra's own long-term plan "Guidelines for Road Management and Development 2015", the external evaluation carried out on R & D activities, and the results of a number of seminars.

### 3 DIRECTION AND FOCAL AREAS IN R & D WORK

In its new role, the Finnish Road Administration assesses the road traffic system and the products and services generated therein as a part of the service production of the entire transport network. In this task, Finnra directs its research and development resources to the administration of impacts of road management and the development of products and services required by the needs of society. This requires applied research on the discovery of new solutions and operating models. The task also demands broad-based cooperation with a variety of different authorities and research establishments, universities, and other centres of expertise.

The Ministry of Transport and Communications provides guidelines for the agencies under its jurisdiction by means of annual result targets that embrace such items as traffic safety, traffic capacity, regional and social equality, and environmental considerations. In meeting these targets Finnra's task is to convert them into working quality criteria for products and services that are acquired. The demands set on products and services, and on the correct defining of these, provide the Administration with a major challenge.

In the service production chain, the transformation of these product & service requirements into the respective technical standards and norms on materials, goods, or services is a further challenge at the next level. The technical development of services and technology is an area that should in principle see the responsibilities passed increasingly to other stakeholders in the sector. Nevertheless, Finnra wishes to ensure that the causal chain of "impacts - product requirements - technical specifications" is a viable one, and hence Finnra works in cooperation with the civil engineering and infrastructure construction sector on this aspect of development work.

The areas of specific emphasis for R & D activities have been derived from the six topics presented above in the foreword:

1. Requirements of road users and other client groups
2. Impacts of road management and traffic
3. Asset management
4. Working markets for procurement of road works and services
5. Traffic management
6. Management of traffic and road network information

R & D activities will give priority to these focal areas; approximately 70% of research funding and resources will be put towards subjects relating to them. Since the Finnish Road Administration is also charged with responsibilities for sector-related tasks embracing products and services associated with the public road network (guidelines, issue of norms and standards, etc.), research and development operations will also need to address these matters, and this is estimated as taking around 30% of the annual research budget.

### 3.1 Requirements of road users and other client groups

In order to further the development of the road traffic system it is necessary to gather data on trips, transports of goods and persons, and on the development of different regions within the country. The needs of different population groups are strikingly diverse and it is anticipated they will change as a result of such factors as demographic and regional development, changes in values and living habits, advances in technology, and many others.

The number of freight transports by the business sector, their direction and character, together with the role of road haulage within the logistics of production and distribution, are all affected by changes in the structure of production, regional location, and through alterations in production processes and the customers' own processes.

From the perspective of the balanced development of Finland's regions, great significance must be attached to the efficiency of the transport system and its ability to meet the individual region's present and future trip and transport demand. The predicted internal migration within Finland sets new challenges for road transport infrastructure services, and as a consequence we require a better understanding of the differences that exist between regions and the connections between the traffic system and regional development.

Equally, from the perspective of the production of road services and their correct application it is necessary that we increase our awareness of these changes, the customers' needs and expectations, the functions and processes that underpin these, and not least the interaction between the transport system and other aspects of society.

Research areas that stand out prominently include future studies, regional and national economy issues, logistics, and segmented needs assays determined by population group and production branch alike. In this particular focal area there is also an acute need for close and coordinated cooperation across the entire transport spectrum, since many of the themes covered here are common to all forms of transport, and not simply to road transport.

### 3.2 Impacts of road management and traffic

The Road Administration's task as a centre of expertise in its own particular sector is to present its own expert viewpoint - based on the needs of different customer groups - on the extent, the quantity, and the quality of road services and at the same time to show and justify the optimal character and rationale of its operations. This focal area makes use of previous strategic research projects, among them *Traffic and Land Use* (S1, completed in 1997) and *Community Impacts of Transport Planning* (S11), as well as the results accruing from the extensive *LYYLI* programme ("Environmentally-Friendly Community Structure and Transport System") under the auspices of the Ministry of Transport and Communications.

As an expert agency the Road Administration must be in a position to describe and evaluate the development of the traffic system with increasing accuracy, versatility, and clarity, and also the impact of road management

issues and measures on the various transport policy objectives, showing how benefits and adverse consequences alike affect different parties (in such aspects as road safety, environmental impact, etc.).

Alongside the calculated indices and models it is necessary to develop new means of expressing and indicating the effects of operations and of new measures that are implemented. Impact assessment should be developed as an integral part of the planning process, as a basic tool for the planners' decision making. It is important not simply to develop methodology, but also to make the description of impacts understandable in practice.

One characteristic of this field is broadly-based cooperation across the entire transport sector and throughout the logistics chain, to enable comparison and evaluation of the relative impacts of different measures. The objective is a two-fold one: to arrive at the most efficient road management package with the resources available, and at the same time to direct measures in an optimal fashion across the entire transport system.

At the beginning of the five-year term the intention is to launch a research programme lasting several years, aimed at collating the data produced on impacts in such a way that it will better serve decision makers and to define the evaluation procedures for impacts at the programme and project level.

### **3.3 Asset management**

The Road Administration's assets in this respect are made up of the highways, roads, and bridges that could be described as fixed assets. The expansion of the management of these into a whole embracing the entire road management sphere requires a number of considerations:

- road management must be examined as a whole, including for instance day-to-day care and maintenance, investments, and traffic management;
- development of the administering of the assets, and
- developing the analysis of activities directed towards these assets as an entirety that takes in all aspects - paved roads, gravel roads, and bridges alike.

The objective of this area of research is to improve the management of the road assets under Finnra's administration by developing methods and innovations, with due consideration for transport policy objectives, that make it possible to ensure more efficient and cost-effective road network management.

At the beginning of the period the emphasis will be on cost-effective management of the secondary road network and a strategic research project will be initiated to examine this issue. In addition, there will be studies on the comprehensiveness, accuracy, and direction of the information gathered on the road network, and on the development requirements for systems for management and improvement of the entire public road network.

Assets administration and the previously-mentioned impacts research will be developed side-by-side, but as separate entities.

### **3.4 Working markets for procurement of road works and services**

Finnra will develop and deploy procurement practices that create the conditions for the emergence of a workable and healthy market in road management. By means of developed procurement methods it will be possible to make the best use of the innovativeness of consultants and contractors in the production of services and to bring about increased productivity in the sector.

The research areas calls for work in developing for instance new product and service concepts, criteria for evaluating tenders and for the selection of contractors, a system of quality requirements, quality control procedures, and information management tools. Important development areas for information management include price and cost management, tools to be used in tendering, and the changeover to e-commerce in purchasing of products and services. The research domain has a clear collaborative interface with the "INFRA Construction and Services, 2001-2005" technology programme administered by TEKES, the National Technology Agency, and participation in this programme will require close cooperation with the other stakeholders in the construction sector.

### **3.5 Traffic management**

The significance of traffic management as a part of road management is growing. In both the Ministry of Transport and Communications and within the European Commission there is a recognition of the pressing need for traffic management services and common practices, and the preparatory work in this sphere requires R & D input and increasingly close cooperation with a range of partners. The development of telematics and the information society also sets its own challenges to be a part of the progress towards new traffic management services geared to securing safe and smooth-running transport systems.

In the field of traffic management, research and development activities focus on enhancing basic services, in other words providing information on traffic conditions and controlling and averting disturbances in the system, and on ensuring that these services function properly, i.e. by developing Traffic Management Centre operations and real-time monitoring systems as follows:

- The main research focus in the area of informing road users and others is in developing radio (RDS) & Internet applications, and in measuring impacts reliably and from all viewpoints.
- Research into real-time traffic control will focus on exploring the most cost-effective solutions and examining new techniques and operating principles for the use of variable message signs (VMS), in such a way that we move from local pilot projects towards regular installation.
- Monitoring of road weather conditions and traffic flow will also concentrate on developing new and cost-effective methods for collecting and refining data on weather and traffic conditions, both at specific locations and along the length of major highways. This will further include the development of short-range prediction methods.

- The most important element in developing Traffic Centre operations is to secure working cooperative arrangements with other actors in this field, both locally and at the national level.

Traffic management research and development is integrally linked with the European Union's VIKING MIP 2001-2006 national and bilateral traffic management and ITS implementation programme. This project also includes transport authorities from Sweden, Denmark, Norway, and Northern Germany. The Finnish representatives are the Ministry of Transport and Communications and Finnra, which has the national coordination role. Finnra's R & D staff are also taking part in the Ministry's own FITS 2001-2004 programme, which is exploring telematics and intelligent transport systems.

### **3.6 Management of traffic and road network information**

Finnra can achieve considerable benefits from improved data management, more specifically through the optimal application of data, information systems and data services. Information management creates the framework not merely for the activities of the Finnra organisation, but also to foster economical road management.

The main areas of interest in this sector range broadly across the traffic system, control and planning of road management, procurement questions, and the development of data and data services on the upkeep and use of the entire road transport system for use by other Finnra processes and departments.

Finnra is also developing its own online data services for a range of user-groups.

As a part of the research work carried out in other focal areas, information management solutions will be developed to assist in the following:

- data systems for client processes
- acquiring the relevant data on roads and traffic for the development of the transport system
- geographical information systems
- developing road management guidance systems, and
- the development of electronic procurement systems in cooperation with the entire sector.

In order to improve the management and use of the road traffic system and its ancillary services, R & D activities will include the development and implementation of a national road and street database (DIGIROAD). Finnra will develop its methods and systems in this direction with the aim of enhancing the management and utilisation of the geometry, physical features, traffic and travel-related characteristics of all roads and streets in the national network. Finnra is particularly interested in developing its own tools and applications, but is also involved in the development of the common use of other database resources and its own data services.

Finnra is developing road management control systems for its own use as tools for optimising road management, priority setting and impact manage

ment and assessment. Among the most important projects in the next few years will be research into the upkeep of gravel roads and road bridges, and the administration of the road and street network as a whole. Design and construction will be supported by developing and upgrading cost-awareness tools and the methods used in drawing up cost estimates.

Data and data-related services will be actively offered to others in the sector. In this way Finnra hopes to promote information sharing and free access, with the aim of achieving greater common benefits and thus creating the conditions for commercial services.

### **3.7 Sector tasks**

As the agency responsible at the national level for administration of the public road network, Finnra also has obligations in the area of developing road management products and services. This involves both regular maintenance and also investments and traffic management. This sector-oriented responsibility requires that Finnra invests sufficient resources in research and development and in personnel know-how for road and traffic management.

In many of the matters relating to the development of road management, this development responsibility goes well beyond the public road network and the traffic conditions pertaining on it. The agency's position is based on its role as a major player in the transport sector and on the confidence of others, acquired through experience. Sector responsibilities are also set out in the acts and statutes governing Finnra's operations. Finnra has a broader monitoring and development task in such areas as:

- road safety,
- certain environmental questions,
- traffic management and control,
- the setting of norms for bridges, structures and equipment, and
- private roads.

A part of this sector responsibility is derived from Finnra's position as a national authority in such matters as EU and CEN (European Committee for Standardization) standards setting, the issuing of norms, handling of matters relating to road and traffic legislation, and in responsibilities to the Ministry of Transport and Communications, the Ministry of the Environment, and the Ministry of the Interior on road management questions.



## **4 OPERATING PRINCIPLES**

### **4.1 Preparation of research programmes**

The annual research and development programme is based on the approved strategy, and activities are directed towards the focal areas. These areas of special emphasis are defined on the basis of the needs of several processes within the Road Administration. Each research theme has a designated person in charge, responsible for coordinating and administering the theme and reporting on activities and results to the steering process.

As a basic framework for the R & D programme, the core processes determine specific problem areas and research projects for the research plans of the individual areas of emphasis, and specify what sort of development work is required. The steering process works with the other processes to place the projects in an order of priorities. Joint committees put together recommendations for projects and agree on the distribution of responsibilities for specific themes.

### **4.2 Selection of projects**

Strategic projects are research programmes that have a considerable significance for the operations of the Road Administration as a whole and often require substantial investment over several years. Before any strategic project is launched an initial assay is carried out to examine the nature of the problem under study, to set the goals of the programme, and assess the likely resources required.

Research projects that are included in the R & D programme are allocated project files, indicating the topic to be studied and the outstanding problems in sufficient detail, the main features of the planned research, estimates of costs and the likely research timetable, and the results that can be expected, along with how these results are to be further utilised.

The programme may also include themes agreed with other actors in the sector, in which Finnra staff and others explore overlapping problematic aspects of a topic common to all. Projects funded from the Finnra R & D budget and carried out in collaboration with outside parties also have their own project files.

### **4.3 Project financing**

Projects taken into the R & D programme are financed in principle throughout the entire expected duration of the project. The programme goes forward through the entire strategic period in such a way that new projects can be approved for funding at different stages during the whole year. A share of research funding is also allocated to ongoing research and development associated with Finnra's role in the broader infrastructure sector.

#### 4.4 Research cooperation with other establishments

Finnra commissions research and development projects from research institutes, universities, and outside consultants. Finnra's own work in these instances is comprised mainly of defining the problems to be investigated, ordering the work, supervision, and application of results. When work is commissioned, due attention is paid to the development of expertise in the field, for example through forming alliances and making use of graduate and doctoral studies.

Finnra is active in developing R & D networks and bringing together cooperative ventures with research institutes and consultants as well as with the other actors in the transport sector. Finnra takes part in EU-administered research when the projects mesh with its strategy. Those wishing to take part in EU research projects must ensure a positive financing decision from Finnra before submitting their tenders for research if they wish Finnra to participate in the research funding.

#### 4.5 Publication of research programme and results

Details of the research programme are updated on the internet as and when new projects are admitted to the programme or earlier projects are completed. Finnra's own professional journal *Tiennäyttäjä* \* provides summaries and abstracts of new research projects. Details of the various online and other publications are also passed to the International Transport Research Documentation (ITRD) database maintained by the road transport research units of the OECD. The aim is to ensure that the most important studies carried out in Finland are accessible from international databases, and hence English-language abstracts are included. The most important research projects are also released in translation in English.

In the programming of projects the measures required for making results available for use are determined at an early stage. In most cases publication is in printed form or digitally via the Finnra websites, but other channels of distribution are also used.

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\*The Finnish Technology Transfer Center publishes a corresponding quarterly, *Finncontact*, in pdf form: see <http://www.tiehallinto.fi/finncontact.htm>. The Center (FinnT2) is a cooperation organisation for international and domestic technology transfer in the road sector. FinnT2 also serves as a communication forum between organisations, people and cultures in the sector. The newsletter is published to inform about road technology, highlights in technical and management issues, written and visual material available, and training.

## 5 PROJECT GUIDANCE AND SUPERVISION

The Finnish Road Administration's Board decides on the research and development strategy. The agency's Management Committee decides on the R & D programme and on the initiation of strategic projects, which are then supervised by steering groups drawn from the relevant stakeholders.

The steering process prepares the decisions on adoption of a programme and handles matters such as changes or additions to the programme and the financial management of it.

Technical Services are responsible for the drafting of strategies and research programmes in collaboration with the other processes and also for R & D implementation and reporting. Reporting of the progress and finances of research projects is carried out as a part of the overall Finnra reporting system, and in addition an annual R & D summary is made.

The Finnra Management Committee carries out supervision of the progress of the overall R & D programme and strategic projects. Activities are evaluated according to standard operating procedures, with an annual assay carried out on the progress of the programme and evaluations of the strategic projects made on their completion. In the case of longer-term projects with a duration of more than three years, evaluation is also carried out at the half-way stage.

## 6 BUDGET FUNDING FOR R & D

The Finnra research and development programme's budget is approximately 1% of the sum allocated for basic road management operations. In 2002 the programme is budgeted at slightly less than EUR 6 million, and during the five-year period discussed here, the average annual figure is roughly EUR 7 million.



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