

Research in motion

Challenging mobility

The mobility of people, goods and information is a key element of modern societies, crucial for their economic and social development



- Planning, managing and operating transportation systems, in order to fulfil the everlasting increase of mobility needs, while controlling the direct and indirect costs, is a difficult and important challenge
- Addressing this challenge requires the creation of new paradigms and, therefore, the development of advanced interdisciplinary research

Transdisciplinary research

Swiss EPF are among Europe's most innovative and productive technology institutes

- emphasizing both fundamental research and engineering applications
- The Schools' structure facilitates transdisciplinary research and encourages partnerships with other institutions



A visible interface with society

Switzerland needs a visible transportation center, involving all aspects of mobility of people, goods and information



- EPFL Transportation Center
- Transportation research is one of the transdisciplinary fields that brings together the whole spectrum of EPFL's key competences, since it potentially involves all the faculties at EPFL
- The center must play an active role to promote existing and develop new research and teaching efforts in transportation. It will also be an interface with the scientific community, professionals and society

Objectives

An interfaculty multidisciplinary center is compulsory in order for the transportation domain to acquire a global presence



- Its objectives are twofold: to continue to develop and increase the international reputation in research and academics, while sustaining the role of an indispensable resource for Swiss public authorities (Confederation and Cantons) and the private sector

Targeting the best in...

Research



- Federate scientific activities dealing with transportation issues and provide excellent visibility
- Identify strategic research topics and promote associated projects
- Encourage multidisciplinary research
- Develop the networking of researchers both inside and outside Switzerland
- Facilitate the creation of consortiums for efficient reactions to international calls for research proposals

Targeting the best in...

Teaching



- Strengthen and coordinate the supply of transportation courses offered in Switzerland
- Develop continuing education programs designed for professionals
- Teach the interdisciplinary nature of transportation and its interfaces with other fields such as energy, environment, information and communication, basic sciences, management, economics, etc.

Targeting the best in...

Interface with society



- Industries such as car manufacturers, airlines, rail companies, etc.
- International organizations and aid development agencies
- Administrations in charge of transportation issues in Europe or local metropolitan planning offices
- Consulting companies
- Strong presence in the media and current political debates in Switzerland and Europe

Strategic topics

The strength of EPFL is to develop transdisciplinary research that enhances a unique knowledge foundation to the world of mobility



- The Center focuses namely on
 - the analysis and prediction of mobility trends,
 - transportation demand modeling,
 - network and infrastructure design,
 - planning and urban development,
 - innovative infrastructure construction,
 - evaluation and supervision of policies and
 - environmental and energy impacts
- Considerable innovative capabilities are borne from the collaboration of researchers from engineering, architecture, social and basic sciences

Strategic topics I

Transport and environment



- Transportation accounts for about 21% of greenhouse gas emissions worldwide; it is projected that this proportion will rise significantly for certain regions such as Europe and Latin America
- The International Energy Agency (IEA) forecasts that transport sector emissions of carbon dioxide (CO₂) will increase by 92% between 1990 and 2020

[Gorham (2002) Air Pollution from Ground Transportation. An assessment of causes, strategies and tactics, and proposed actions for the international community, United Nations]

Strategic topics II

Transport and energy



- The transportation sector represents 26% of the world energy consumption, and 58% of the world petroleum consumption

[Key world energy statistics, International Energy Agency, 2006]

Strategic topics III

Mobility



- Mobility is one of the fundamental foundations of our civilization, with Western societies organized accordingly around flows.

[Manuel Castells]

- However, the environmental consequences of mobility threaten society. Therefore, our civilization must essentially maintain and develop mobility while limiting its environmental impacts.

Strategic topics IV

Information



- Transport and information systems have long been closely linked because they are both complements and substitutes of each other
- Until the invention of the telegraph, distant communications were dependent on transportation
- Nowadays, the availability and mobility of information play a crucial role for the mobility of people and goods

Strategic topics V

Transport economics



- Transport economics is a branch of economics that deals with the allocation of resources within the transport sector and has strong linkages with civil engineering
- Positive externalities of transport networks: the ability to provide emergency services, increases in land value and agglomeration benefits
- Negative externalities are wide-ranging: local air pollution, noise pollution, light pollution, safety hazards, community severance and congestion

[Wikipedia]

Strategic topics VI

Urban planning and land use



- The number of traveled kilometers by car per person and per day vary, simply or conjointly, according to a household of a collective building in an urban center compared to an individual house in the suburbs
- In order to become efficient, innovation in transportation induces a need for a city's reflexive thoughts at all its levels, from the conception of exchange hubs to planning tools of urban regions and the appeal of housing in dense zones

[NFP 54 Swiss National Science Foundation]

Strategic topics VII

Multimodality



- Multimodal transport and logistics services, as an essential part of the global production process, are becoming increasingly important for the development of international trade
- Advances in technology and communication have led to changes in transportation practices, with an overall increase in transactions at the global level and the exponential growth of international multimodal transport. This trend is reflected in the expansion of containerized traffic, which is expected to double in the next decade
- [Expert Meeting on Development of Multimodal Transport and Logistic Services, September 2003, Geneva]

Strategic topics VIII

Vehicles and infrastructures



- The necessary measures to achieve these objectives consist of: greater application of the polluter-pays principle and cost transparency, construction of modern infrastructure, high-performance rail network, efficient and safe road infrastructure, safe and environmentally sound vehicles producing few or zero CO2 emissions...

[Challenges 2003–2007. Trends and possible future issues in federal policy, Report of the Forward Planning Staff of the Federal Administration, Switzerland]

Strategic topics IX

Intelligent transportation systems



- Evaluation of the smart card electronic payment system in Ventura, California, indicated potential savings of \$9.5 million per year in reduced fare evasion, \$5 million in reduced data collection costs, and \$990,000 in transfer slip elimination. Over a one-year period a traveler using an in-vehicle navigation device could experience an 8.1% reduction in delay, a 4.6% reduction in the crash rate, and a 3% reduction in fuel consumption

[Intelligent Transport Systems. Benefits and Costs. US DOT, 2003]

Structure

All of the EPFL's 5 schools and colleagues from ETHZ are key players in the Transportation Center activities



- **ENAC**
School of Architecture, Civil and Environmental Engineering
- **BS**
School of basic sciences
- **I & C**
School of computer & communication sciences
- **CDM**
College of Management of Technology
- **STI**
School of Engineering
- **ETHZ IVT**
Institute for Transport Planning and Systems

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Thank you for your attention

