



RODOS

DEVELOPMENT OF TRANSPORTATION SYSTEMS



RODOS is a unique research platform for the future of intelligent transportation in the Czech Republic. RODOS brings together the academic community, government agencies, and leading Czech companies, where our strengths are combined to seek out new ways to monitor, model, manage and charge for transportation. Our long-term strategic goal is to use new tools for transportation informatics to create a comprehensive body of information, and to integrate this into existing ICT systems.

**We make
transportation dynamic**

Center for the development of transportation systems – RODOS

As we speak, the Czech transportation system is already straining under the increased burden of mobile people and goods, yet its capacity cannot easily be expanded. It is therefore necessary to seek out other ways to efficiently monitor, model, manage and effectively charge for transportation. Such a difficult task must be tackled using the most modern methods, the best technologies, and in accordance with the needs and interests of the state and commercial spheres. That is why RODOS was created as part of the Ostrava supercomputer research program at the IT4Innovations Centre of Excellence.

RODOS combines top technical universities, specialized scientific institutions, and leading Czech companies, into an association which not only has bold plans but also the potential and real power to fulfill them.

The RODOS Center does not exist in a vacuum. As researchers, we are aware of the strategic position of the Czech Republic in the center of Europe. We are monitoring trends abroad and designing systems which will be able to cooperate with the applications of neighboring states.

And most importantly, all the benefits gained are permanent. RODOS is not a one-time grant project which will disappear after the subsidies from the Technology Agency of the Czech Republic dry up. Even after the research program ends, the benefits achieved will remain applicable and anchored in everyday life.



- **prior period** – preparation of the strategic research agenda of the RODOS Center

Task areas

From 2012–2018, the RODOS center will be addressing 7 task areas, concerning specifically defined aspects of transportation. The results of research will affect everyone. Not just because the Czech Republic will gain advanced tools and methods for forecasting, modeling and managing transportation, or that it will be able to more effectively collect transportation fees. Above all, regular motorists will be able to plan and change their trips based on current road conditions. This will reduce stress and save time and money.

So just what exactly are the task areas which the RODOS program will be addressing?

2012

- analysis of target groups of transportation users, selection of economic indicators for transportation
- analysis of available technologies for the collection of input data and phenomena associated with mobility
- analysis of the properties of input data and phenomena associated with mobility and possible pre-processing of data

1. Project management

All members of the RODOS consortium will take part in project management through two committees, the implementation committee and the steering committee. This task area will involve the regular creation reports, summary reports, monitoring reports, implementation, financial and technical reports, which will evaluate the progress and partial results of the entire program. Project management will also handle communication strategies or plans for the commercial use and deployment of project results.

2. Comprehensive database of the movement of people and goods in the CR

This task area will create a unique database of the mobility of people and goods in the transportation infrastructure of the Czech Republic, containing data from current systems (such as the toll system, sensors integrated into the transportation infrastructure, camera systems, transporter dispatching systems, information systems from logistics centers etc), as well as from innovative sources (GSM network signals, floating car data using GSM/GPRS technologies), which will fill in the gaps in current databases. This database will be used as an input for the dynamic mobility model.



2013

- proposal of database architecture and methods for storing, receiving and pre-processing data
- creation of a basic version of the Czech mobility database
- integration of select functions of the dynamic mobility model into existing software platforms
- basic version of a cognitive-behavioral model for transportation users
- pilot testing of usage-based tolls for cars on major arteries of the Czech Republic

3. Dynamic mobility model for the CR

Thanks to the comprehensive mobility database, we will be able to create a dynamic mobility model which will provide inputs necessary for “new generation” control and information systems. Transportation, emissions, and power models will be integrated at a single place. New functions will provide overviews of the current and future status of transportation systems. There will be tools to predict and manage transportation, including crisis situations. The model platform will have an interface for easy application in other systems. There will also be special maps to look at mobility in entirely new ways.

2014

- launch of partial operations of the comprehensive mobility database, creation of an interface to access current data collected from the transportation infrastructure
- deployment of forecasting tools of the dynamic mobility model, design of new software modules for control systems

4. Innovative traffic management systems

The fourth task area concerns the development of innovative systems to manage urban and rural traffic. Naturally, the new systems will use the comprehensive mobility database and dynamic mobility model. The current rural management systems will be adapted to new inputs from the dynamic mobility model, urban systems will be optimized for individual regions, cities, and high volume corridors, so that traffic flows as smoothly as possible, making optimal use of network capacity to prevent crisis situations.

- implementation of visual functions of the dynamic mobility model
- new models for financing the transportation infrastructure and legislative conditions for various types of charges

5. New models for financing transportation infrastructure

This task area creates new models for financing the transportation infrastructure using standard instruments. The basic premise is that users should pay the full cost for the transportation infrastructure they are using, and not somebody else. Different users naturally burden the infrastructure in different ways, some of which are currently being paid for by society as a whole. New models of financing will be based on analyzing cost structures and the behavior of groups of transportation users. A pilot project will test usage-based tolls for cars on major arteries of the Czech Republic.



6. Methods for modeling and optimizing multi-modal mobility

The sixth task area will develop tools to support decision making for operative and strategic planning and management of mobility in the Czech Republic. New modeling methods will take into account all possible impacts and relationships in the complicated conditions of today's society. Here, the transportation system will be viewed from the perspective of the individual, with respect to his activities and goals. Proposals will include an agent model based upon micro-modeling and the cognitive-behavioral profile of transportation users. A computer model will open the way to systematic management and optimization through tolls, tickets, routing, parking zones, and timetables for public transportation.

7. Education and dissemination of the center's work

An integral component of the RODOS project is the dissemination and communication of the results achieved, along with the education of the professional public, students, end users, potential customers, and the media. This task area quite logically overlaps with all the others, and will be shared by all members of the consortium. Aside from workshops for end users, two international conferences will be held. We also anticipate the transfer of young researchers between individual partners to give them a better grasp of individual fields and let them choose the ideal direction for their careers.

2015

- ongoing testing of the dynamic mobility model, comparison of optimization methods with real data
- deployment of new management methods in select locations on expressways and road networks of cooperating cities
- cognitive-behavioral model of transportation users containing dynamic parameters of behavior
- conference of the RODOS consortium attended by international experts
- incorporation of lesson plans and materials into the educational programs of cooperating universities
- workshops on the achieved and planned results of the project



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2016

- methods and algorithms for optimisation of multimodal mobility working in real time
- methodology for optimisation of the rural and urban traffic/transport network, verification of control system methodologies

2017

- assessment of the partial operation of the mobility database and description of the methodology for creating, operating and maintaining it permanently under real conditions
- assessment of the partial operation of the dynamic mobility model and description of the methodology for creating, operating and maintaining it permanently under real conditions
- assessment of the partial operation of rural and urban management systems
- international conference

2018

- ongoing assessment of the effectiveness of new methods in influencing and managing mobility using innovative systems, and proposals for improvement as needs arise
- ongoing education of the end users of the center's products
- continuing innovation

Center benefits

Although the benefits of the RODOS center are clear, we would like to emphasize two of the most fundamental:

- Tools will be created which will increase the efficiency of the national transportation system. These tools will be tested in pilot projects and then prepared for immediate deployment at full operation
- The tools and methods developed will increase the prestige of the Czech Republic abroad, and improve its ability to compete on the market of intelligent transportation systems, since the RODOS center research will have great potential application abroad

Target groups

The research of the RODOS center is intended primarily for three target groups:

- Public institutions responsible for the operation of highways and roads
- Commercial partners
- The professional public



RODOS in brief

If we were to introduce RODOS in 5 simple statements, we would say:

- We are a unique collection of experts from academia, leading Czech companies, and the public sector
- We provide comprehensive modeling, management, and optimization of the transportation of the future
- We have at our disposal the most modern facilities, the greatest expertise, and the super computing capabilities of the IT4Innovations Centre of Excellence
- We are bringing innovation to transportation and are eliminating the age-old stereotypes which plague and impact each and every one of us
- We are working with the goal of truly shaping and improving the current transportation situation, and are giving new direction to the field of transportation informatics

We're designing the future of transportation

The Center for the development of transportation systems is comprised of:

Vysoká škola báňská – Technical University of Ostrava

A technically oriented university with more than 160 years of tradition, recipient of the RODOS project
www.vsb.cz

Transport Research Centre

The only public research institution under the competence of the Ministry of Transportation
www.cdv.cz

Czech Technical University in Prague

One of the oldest technical universities in the world, focusing on applied science
www.cvut.cz

Brno University of Technology

An internationally recognized educational institution among the best in the world
www.vutbr.cz

CAMEA, spol. s r.o.

Manufacturers of image and signal processing systems to monitor highway traffic
www.camea.cz

CE-Traffic, a.s.

A leading provider of transportation data and information services for Central Europe
www.ce-traffic.cz

Central European Data Agency, a.s.

The first company completely devoted to acquiring and managing map bases in digital form
www.ceda.cz

The ELTODO Group

An engineering design company which produces, installs, and supplies products for transportation and telematics
www.eltodo.cz

Kapsch Telematic Services spol. s r.o.

Operator of a national system for electronic toll collection
www.kapsch.cz

KVADOS, a.s.

Specialists in mobile information systems and managing resources in the field
www.kvados.cz



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