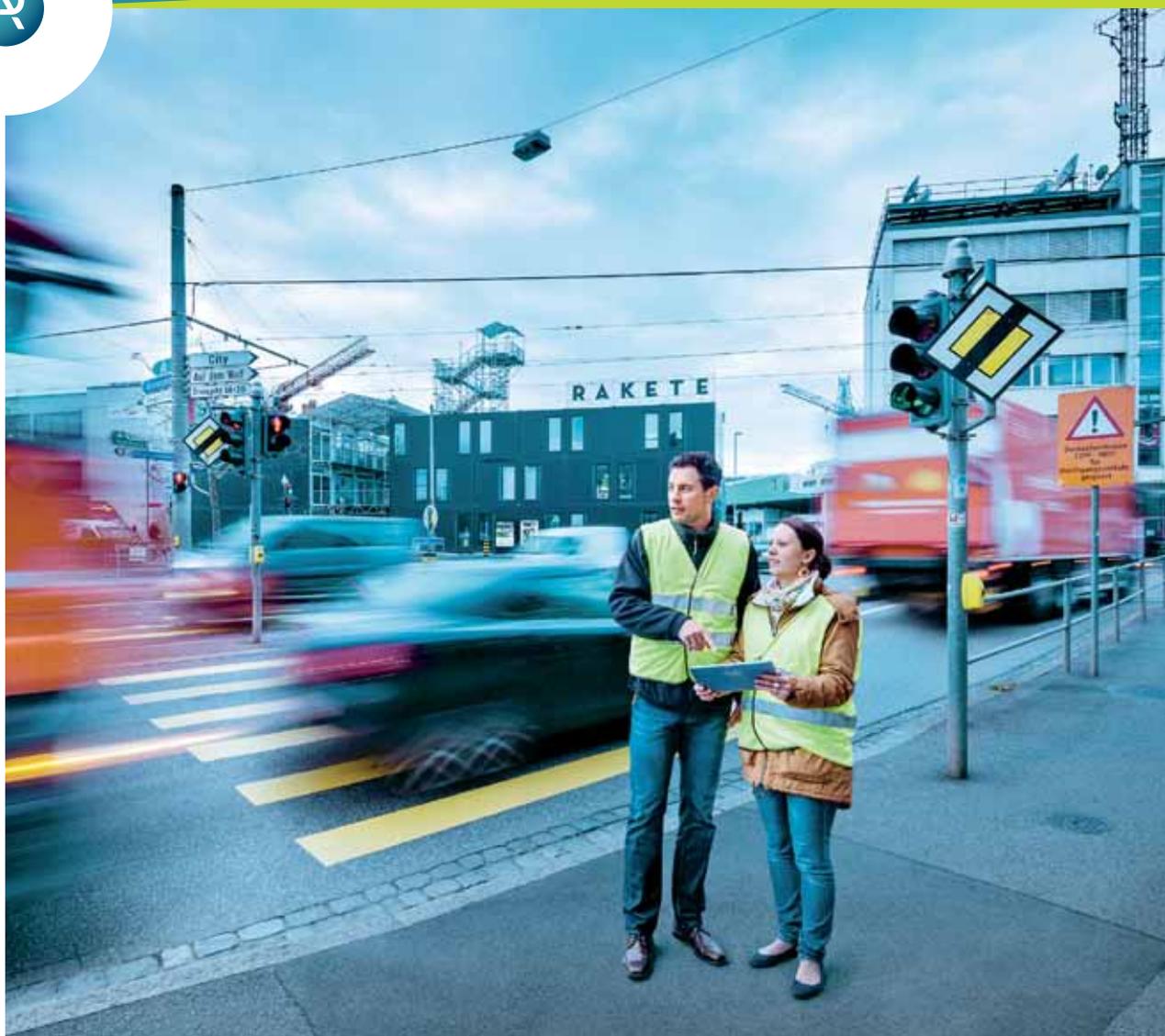


Advise.
Plan.
Control.

ITS Services

Shaping Smart Mobility Solutions

RAPP



Rapp – Shaping Smart Mobility Solutions



Our clients care about smart mobility and we help them to achieve their goals.

Rapp is a consultancy firm that specialises in strategy and technology, advising public and private stakeholders on how to shape the world of intelligent transportation systems (ITS), where rapidly developing technological capabilities interact with policy intentions, regulatory framework conditions and business concerns.

Positioning services and wireless connectivity will become part of almost any moving object and individual, creating enormous amounts of data which enable a new level of regulatory and business driven applications and customised services. Appropriate measures to mitigate security risks and data protection concerns are a prerequisite for a sustainable solution.

Our team shapes the future of smart mobility solutions in the best interest of our clients.

Rapp has a proven track record of significant studies and successful projects.

We invite you to discover more on the following pages.

ITS Application Expertise

We offer an international and interdisciplinary team of some 80 experts who provide a holistic view of the opportunities and challenges. Our clients benefit from a broad spectrum of well-founded and focused policy and management advice down to concrete technical specifications and implementation support.

Whilst supporting our clients, we draw upon specific know-how and expertise in several ITS application areas, a valuable asset when shaping suitable and solid ITS solutions for our clients.



4
5
“We draw upon specific know-how and expertise in several ITS application areas, a major asset when developing ITS solutions.”

Bernhard Oehry, Managing Director

Our specialists' fields of expertise also cover specific technologies such as RFID, DSRC, ITS-G5, smart cards, GNSS and GSM.

We actively participate in European R&D projects, international panels and ITS standardisation committees in order to keep abreast of market developments.

Our Offering

The successful handling of a project begins with the right strategy and ends with full operation. We work closely with our clients to find solutions for their specific needs and support them throughout every phase of their projects.

Project and Strategy Evaluation

- › Problem and challenge identification
- › Technical, commercial and organisational concepts
- › Policy advice

System Concepts Development

- › System architecture
- › Functional and technical specifications
- › Operational procedures
- › Service and enforcement concepts

Project Management

- › Organisation and planning
- › Monitoring and control
- › Quality assurance
- › Risk management

Business Plan Development

- › SWOT analysis
- › Business case modelling
- › Cost-benefit analysis
- › Financial plan

Market Research and Analyses

- › Demand and supply market review
- › Revenue and demand forecasting
- › Legal framework and requirements
- › Patent analyses

Technology Trials

- › Trials objectives and planning
- › Evaluation criteria
- › System architecture incl. ground truthing
- › Trial data analysis and reporting

Feasibility Studies

- › Technology review
- › System concepts and scenarios
- › Regulatory evaluation
- › Commercial viability

Procurement and Tender Support

- › Procurement strategy
- › Tender guidelines and specifications
- › Output-based and interface requirements
- › Evaluation guidelines and criteria

ITS Policy and Strategy

- › Objectives and goal setting
- › Option assessment
- › Rules, regulations and governance issues
- › Data protection and user privacy
- › Partnership strategy

Implementation Support

- › Implementation plans
- › Test strategy, plans and suites
- › Test witnessing
- › Training and skills transfer

Road User Charging



Swiss Heavy Vehicles Fee (LSVA)

LSVA has been a pathfinder of internalising the external costs of goods transport by road. It charges heavy vehicles for all distances driven in Switzerland. The charge is collected by means of on-board equipment that utilises advanced technologies. LSVA has been in successful operation since 2001 and was implemented with the support of Rapp Trans as a partner.

Rapp continues to contribute to the optimisation and further development of the operational system, including procurement of later generations of road-side and on-board equipment. Rapp represents the interests of LSVA in European standardisation and supports the development of the (Regional) European Electronic Toll Service ((R)EETS).

German Truck Tolling System

The truck tolling system in Germany has been charging trucks with a weight of over 12t on motorways since 2005, and is operated under a public-private-partnership contract.

The operator Toll Collect is responsible for the automatic and manual charging system and technical operation of the enforcement equipment.

Rapp advises the Federal Ministry of Transport and Digital Infrastructure on technical issues associated with road user charging. This includes the implementation of the European Electronic Toll Service (EETS), the extension of the toll road networks to selected federal roads in 2013 as well as further development of the toll system and its monitoring.

Mobility Pricing

Transport Financing Models is one of the major road research topics of the Swiss Federal Department of the Environment, Transport, Energy and Communication (DETEC). The research programme on mobility pricing examined all aspects of charging for the use of transport infrastructure and services. It investigated instruments and mechanisms for the overlapping domains of transport financing and traffic management.

The research also shed light on the consequences of moving transport financing from general taxation towards more use-related charging.

Rapp managed the programme and prepared the synthesis report on which the road map of DETEC is based. Policy development for mobility pricing is ongoing with Rapp as a key contributor.

French Heavy Vehicles Tax

The national heavy goods vehicle tax (écotaxe poids lourds) project was launched by the French government in autumn 2007. The project involves the collection of a distance-based tax without stopping the liable vehicles and the deployment of innovative contracts and technologies.

A consultancy team led by Rapp supported the French government in the planning of this strategic project to be implemented within a very short time frame. Our team was responsible for the general and technical assistance during the programme, preparation of the statement of requirements, and supporting the procurement process through the competitive dialogue up to the finalisation of the contract.

6
7
“The long-standing cooperation with Rapp based on trust and reliability, the low fluctuation rate of employees together with their high degree of expertise have given the Swiss Federal Customs Administration (FCA) considerable added value in the procurement, operation and further development of the LSVA system.”

Bruno Hofstetter, FCA

Compliance Checking and Enforcement



Intelligent Access Program (IAP) Vehicle Mass Monitoring

The IAP is a voluntary programme supported by the Australian road authorities. It provides heavy vehicles with improved access to the road network in return for monitored compliance with specific access conditions. Compliance is monitored by private service providers through the use of certified GPS-based in-vehicle units.

Rapp was responsible for the development of the specifications for the on-board unit and the associated test suite for the certification of service providers and equipment. The monitoring regime has been developed to include fatigue and weight-compliance measures.

Section Speed Control

The Swiss Federal Roads Office (FEDRO) is testing the effect of automatic distance-over-time enforcement installations on driving behaviour and traffic safety. The study includes a fixed installation on an open motorway section, a fixed installation on a tunnel section with variable speed limit and a portable installation mainly for the use on sections with road works.

Rapp Trans is responsible for the scientific analysis of the effect of the installations on traffic. We also support FEDRO to evaluate the ideal motorway sections for the tests, to develop the specifications for the equipment, to evaluate the tender offers and monitor the implementation phase.

There are attempts in Europe to establish automatic screening of the weight and load data of commercial vehicles. The intention is to have an enforcement regime where the number of preselection measures is equivalent to at least one weighing per 2,000 vehicle kilometres per year on average.

Rapp has analysed the technical feasibility of in-vehicle weighing systems and its cost for line fitment and retrofit.

Digital Tachograph

The tachograph records work and rest hours of heavy vehicles drivers with the aim of ensuring that appropriate rest periods are being complied with. Despite the mandatory installation of tachographs, driver fatigue still accounts for 20% to 30% of accidents involving heavy vehicles traffic. The EU intends to boost compliance monitoring by means of a new recording device called 'smart digital tachograph'.

Rapp performed several feasibility studies from stand-alone solutions to open in-vehicle platform concepts inter alia for the European Commission, considering technical, legal, political, organisational and commercial factors. Additional technical studies on GNSS and DSRC integration pave the way for standardisation and interoperability for enforcement.

Traffic Management



8

9

Alpine Crossing Exchange (ACE)

The Swiss policy of transferring goods transport to rail with a push-and-pull strategy has been a success. However, the target of reducing the trans-Alpine truck traffic from the current 1.2 million vehicles per annum to 650,000 cannot be reached without additional measures.

Rapp recently acted as a partner in two ACE research studies. The first study evaluated a cap-and-trade scheme and a dynamic slot pricing scheme based on the available capacity for HGV traffic through the Alpine tunnels were evaluated. The second study further investigated the cap-and-trade scheme. Based on the results of this study, the Swiss Government has submitted a proposal for the implementation of the ACE to Parliament.

Tunnel Traffic Management

In the course of a motorway maintenance project starting in 2015, the Swiss Federal Roads Office (FEDRO) is planning a comprehensive refurbishment of the Seelisbergtunnel (10km). During the construction work, just one of the two tubes will be opened for traffic. This will serve as a two-way road. To guarantee traffic safety, the capacity in the tube under two-way traffic conditions is

limited to 1,200 vehicles per hour. An interval feed system will be installed for heavy vehicles in order to ensure traffic safety and to minimise thermal load.

Rapp, together with partners, assessed the traffic situation and capacity constraints in this area. On this basis, specific measures have been developed for local and regional traffic management.

Avoiding Peak Hours

The Avoiding Peak Hours project (Spitsmijden A12) aimed at reducing traffic annoyance during the roadworks and at rush hours on Dutch motorways.

A financial incentive was offered to motorists who frequently use their vehicles on these stretches of road to travel at other times, to use another mode of transport, to take another route or not to travel at all.

Rapp provided technical expertise, developed a purchasing strategy and supported the subsequent procurement process.

Traffic Information

European Real-Time Traffic Information

As part of the ITS Action Plan, Rapp supported the EC in the preparation of the specifications for the six Priority Actions in the ITS Directive.

For each of the priority actions, Rapp conducted a state-of-the-art review and stakeholder consultation and, based on this, provided proposals for the options of EU intervention under the ITS Directive.

Rapp performed impact assessments, according to EU guidelines, for the proposed specifications for the European-wide safety related traffic information (SRTI) service and for the information and reservation service for secure truck parking.

Blue Wave

The provinces of North and South Holland, Rijkswaterstaat and the Port of Rotterdam Authority are collaborating on better informed professional shipping and road traffic, such as better information on bridge and navigation lock opening times. The whole planning process within the inland navigation chain is also being improved.

Skippers can arrive at their destination more promptly and smoothly by modifying their speed in response to the information. In this way, more goods can be transported by water, reducing congestion on the roads.

Rapp is representing the Dutch Ministry of Infrastructure & Environment in the Blue Wave (Blauwe Golf) project by providing technical and project management expertise.

Optimising Use Programme

In the Optimising Use Programme (Beter Benutten), the Dutch government, regions and businesses are working together to improve road, waterway and railway accessibility. The programme aims to reduce congestion at the busiest points in the network by 20 percent in 2014 by means of changing travel behaviour and the use of ITS.

The combination of the increasing numbers of travellers who have smartphones and increasingly smart vehicles has inspired new ITS projects through which this programme aims to provide a significant qualitative boost to the available travel information.

Rapp represents the Dutch Ministry of Infrastructure & Environment in seven different projects and provides technical and project management expertise.

Brabant In-Car III

The Dutch A67-highway, located in the province of Brabant, is a vital logistic link connecting the ports of Antwerp and Rotterdam with the rest of Europe. Due to the combination of a high proportion of lorry and commuter traffic, the corridor is prone to congestion.

This project aims to improve accessibility by providing enhanced information to drivers, via apps for the mobile telephone or integrated in existing navigation systems.

Rapp represents the Dutch Ministry of Infrastructure & Environment in the "Brabant in-Car III" project, by providing technical and project management expertise.

“Only Rapp Trans (NL) provides us with the rare blend of expertise required to achieve the 20% congestion reduction goal of the Beter Benutten programme: technology, business and (change of) human behaviour.”

Caspar de Jonge, Dutch Ministry of Infrastructure & Environment

Identification and e-Ticketing

Public Transport Card

Customers using the Swiss public transportation system can conveniently use a single ticket for services offered by a large number of companies. The Swiss public transport landscape will undergo extensive changes in the next few years as e-ticketing is developed further. In the course of integrating e-tickets into current distribution systems, the existing requirements for interoperable distribution, compliance checks and after-sales service must be considered as well as the growing importance of data security and privacy issues.

On behalf of the Swiss Union of Public Transport (VöV), Rapp has prepared a report in which all of the major issues have been examined and fundamental operational aspects presented in their overall context. This report serves as a foundation for the current process of defining a national e-ticketing standard.

Rapp led a consortium to prepare for the procurement of the system and associated operational services such as issuing tickets, processing transactions, clearing, maintaining systems and providing customer care. The main deliverable consisted of the full tender documentation, including the functional specifications and tender guidelines. The assignment was financed by the European Bank for Reconstruction and Development (EBRD).

Electronic Vehicle Identification

The Finnish Vehicle Administration (AKE) commissioned Rapp and a Finnish partner to evaluate AKE's role and the need to develop electronic vehicle identification (EVI) in Finland. The study evaluated several EVI pilot projects in Europe, the emerging technology of RFID as well as the related current status of European standardisation.

The result of the study was that there is, from a traffic and traffic enforcement perspective, little need to actively promote or implement EVI in Finland. However, the work to develop RFID technology internationally and to use this for EVI should be continued with view to being used in potential future applications.

e-Ticketing

The City of Plovdiv in Bulgaria plans to modernise its public transportation system. One of the innovative projects relates to the introduction of a public transport management system, consisting of e-ticketing, fleet management and dynamic traveller information being provided in all buses and at every bus stop.

10

11



Parking Management

Basel Fair Campus Management City Parking Management

The exhibition halls of Basel fair are located in a residential area in the city centre. The realisation of large-scale trade fairs such as 'Baselworld' (a global fair for watches and jewellery) represent a huge logistical challenge. In order to plan, control and carry out transport movements more effectively, the Basel fair has developed a logistics tool. Exhibitors, stand builders, suppliers and delivering companies must register all of their transport movements prior to using this web tool. Registered vehicles then receive a delivery pass equipped with a barcode which is scanned and fed into the system at the various vehicle management and handling points.

With the help of this new regime, traffic jams have been almost completely eliminated.

Rapp supported the Basel fair during the gradual implementation of the logistics tool, covering everything from defining the specifications to the implementation, launch and subsequent optimisation.

Basel, as a centre of a tri-national agglomeration with half a million inhabitants, pursues a restrictive private and commercial vehicle parking space policy for the whole urban area.

Rapp was commissioned to develop a service concept, based on the adopted parking policy, to manage the 30,000 parking spaces available on public roads for residents, businesses, commuters and visitors. The study also included coming up with a range of technological options, including RFID-based parking permits, and evaluating the registration and enforcement processes in operation. The study was the basis for the ongoing implementation of the city-wide on-street parking management scheme, in which all parking spaces are subject to a fee.

Rapp analyses the effects on the demand for parking and the time motorists need to find a vacant parking spaces, using 40 volunteers equipped with GPS trackers, over a three-year period.

“The use of skilled personnel and the innovative collection methods contributed just as much to the success as the specialist networking with partner companies at home and abroad.”

Clemens Huber, Construction and Transport department of the Basle-City canton mobility

Open Parking Data

Car drivers lose time when searching for a vacant parking space, with an adverse impact on both traffic and the environment. The time needed to find a parking space can be reduced if the driver had access to personalised information about the current parking situation. Presently, the available data on parking are fragmented and incomplete.

The initiative Open Data Car Parking aims to ensure that parking operators make their data accessible for the purposes of collecting a pool of information and enabling service providers to use this. These service providers have an interest in using the parking data to deliver enhanced pre- and on-trip traffic and parking information to car drivers.

A precondition for the services to have a positive effect on mobility is to have extensive coverage and easy access to parking data.

Rapp coordinates the Open Parking Data project on behalf of the Dutch Ministry of Infrastructure and Environment.



Cooperative Systems

12
13

“I would like to confirm that in 2013 Rapp Trans finalised an excellent study on open in-vehicle platform concepts for the provision of ITS services and applications in heavy vehicles. It was carried out in a professional manner comprising comprehensive problem analyses and sound recommendations on components, system, application, business and governance levels that has greatly helped the Commission to shape its strategy towards future ITS regulations. I would like to thank your company for this performance.”

Philippe Hamet, Policy Officer
European Commission

Open In-Vehicle Platform

An increasing number of ITS applications can be found in a vehicle. An open in-vehicle platform appears to be indispensable to ensuring interoperability and the development of cooperative ITS. The core idea of an open in-vehicle platform is to create an environment where service providers can access resources in the vehicle and use them to provide a wide range of ITS services.

Rapp performed several studies on potential open in-vehicle platform concepts, considering technical, legal, political, organisational and commercial factors among others, within the framework of the ITS Action Plan of the European Commission.

Vulnerable Road Users

Vulnerable road users are a diverse group which is usually at an increased risk of being involved in road traffic accidents and suffering injuries. The group includes pedestrians, cyclists, motorcycles and mopeds, as well as the elderly and children.

Rapp was commissioned by the European Commission to provide an overview of the reported effects of advanced driver assistance systems, cooperative systems and other ITS applications on the safety and comfort of

vulnerable road users. The study produced recommendations for measures to improve the safety and comfort of vulnerable road users that can be adopted at a European or Member State level.

Shock Wave Jams Prevention

Shock wave jams arise when a driver on busy road is forced to brake unexpectedly, triggering a chain reaction behind him. The public and private sectors have come together to develop new in-car technology to prevent such jams.

The project uses the Pre-Commercial Procurement procedure. This way of tendering reflects the project's innovative character and enables both the market and the authorities involved to innovate together.

The ultimate goal is to select six suppliers, two for each of the three areas: 'Data supply', 'In-Vehicle Systems' and 'Roadside Equipment'.

Rapp represents the Dutch Ministry of Infrastructure & Environment in this project (Spookfiles), providing technical and project management support.



ITS Regulations and Standards

Support the ITS Action Plan

The ITS Action Plan adopted by the European Commission in 2008 and endorsed by Directive 2010/40/EU aims at deploying Intelligent Transport Systems in the European Union.

Rapp Trans supports DG MOVE with the implementation of the ITS Action Plan. By means of a framework contract, Rapp Trans has conducted studies and provided support regarding the use of traffic and travel data, as well as map data and traffic management data. It has also provided support in respect of data security and liability issues, of an open in-vehicle platform and of ITS for vulnerable road users.

Rapp helped to develop guidelines by the Urban ITS Expert Group.

Swiss Standard for Digital Enforcement

The deployment rate of digital cameras being used for traffic enforcement was relatively low, despite their operational advantages. As a result, the Swiss Association of Road and Traffic Experts (VSS), in cooperation with FEDRO, commissioned a research study in order to address barriers to their deployment. Rapp Trans developed an overview of implementation possibilities and existing problem

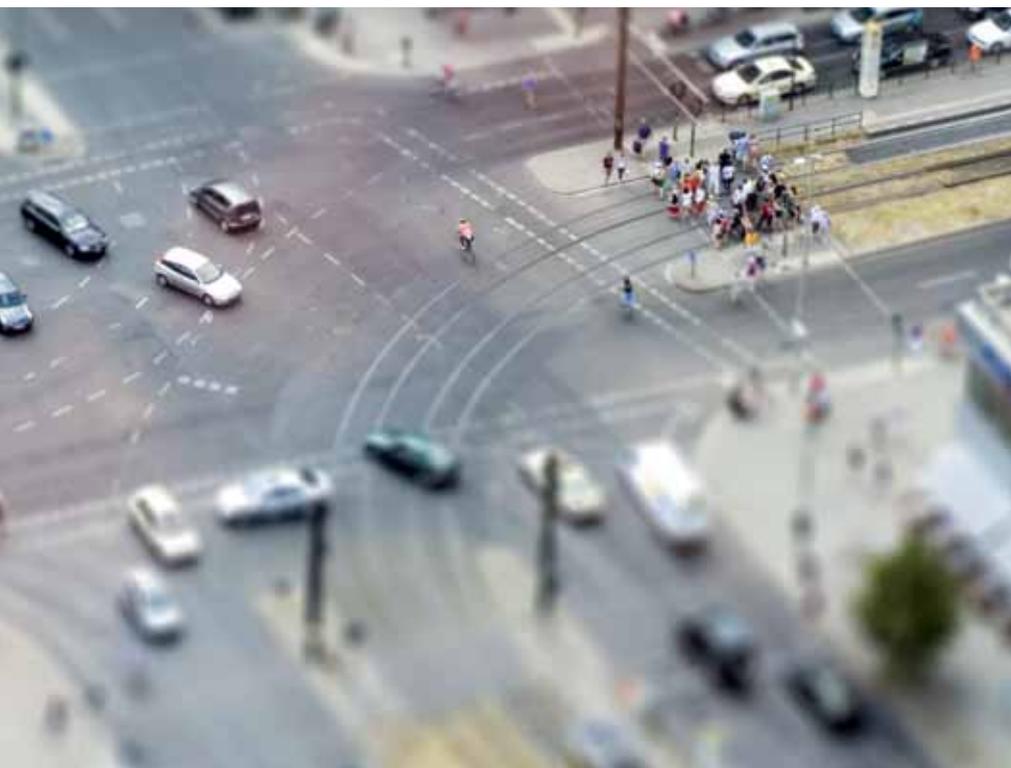
areas with digital pictures. We also analysed existing Swiss legislation and prepared a proposal for the Swiss standard relating to automatic enforcement systems with digital pictures, which has since been adopted

International RUC Standards

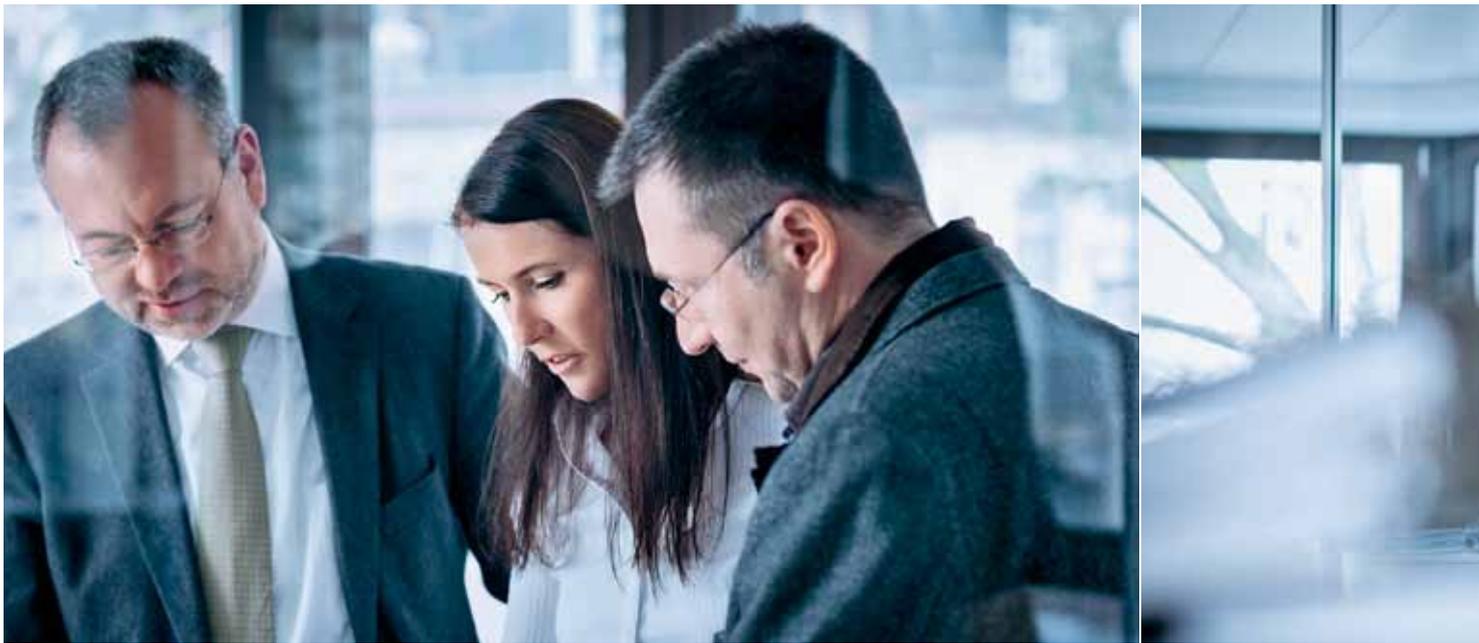
The RUC standards define the exchange of information between toll chargers and service providers. They encompass systems based on DSRC, GNSS/CN and smart card technologies. They include 'requirements' and related test procedures in order to help evaluate product conformity. Charging performance metrics and examination framework provide a basis for service level agreements. The range of standards also includes security guidelines that can be useful in the preparation or evaluation of security requirements.

The RUC standards provide key elements for achieving interoperability. They are used in over 40 countries and 140 systems around the world. More than 80 million compliant on-board units and 30,000 roadside equipment units have been issued.

A Rapp Trans staff member, who is the appointed chairman, coordinates the development of the international and European RUC standards. Our experts are also involved in preparing the standards.



Our Clients



- 14 ASFINAG (Austria)
- Association of British Insurers (ABI)
- 15 Autostrade (Italy)
- Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT)
- Austrroads (Australia and New Zealand)
- City of Plovdiv (Bulgaria)
- City Region of Arnheim-Nijmegen (the Netherlands)
- Danish Ministry of Taxation (SKM)
- Danish Ministry of Transport (TRM)
- DARS (Slovenia)
- Department for Transport (DfT, United Kingdom)
- DKV Euro Service GmbH + Co. KG (Germany)
- Dutch Ministry of Infrastructure and Environment (Rijkswaterstaat)
- Dutch Traffic Management Centre
- European Bank of Reconstruction and Development (EBRD)
- European Commission, DG INFSO and DG MOVE
- European Committee for Standardization (CEN)
- Federal Ministry of Transport (BMVI, Germany)
- Finnish Ministry of Transport and Communications
- Finnish Road Administration
- French Ministry of Ecology, Sustainable Development and Energy (MEDDE)
- GLONASS UNION (Russia)
- Government of the Brussels Capital Region (Belgium)
- Grand Lyon
- HM Revenue & Customs (United Kingdom)
- ITS Sweden
- Kapsch Telematic Services Sp. z.o.o. (Poland)
- Leighton Contractors Pty Limited (Australia)
- Messe Basel (Switzerland)
- National Transport Commission (NTC, Australia)
- Public Works Ministry of Chile
- Roads and Traffic Authority of New South Wales (RTA, Australia)
- Romanian Ministry of Transport
- Slovenian Ministry of Transport
- Swedish Transport Administration
- Swedish Transport Agency
- Swiss Federal Customs Administration (FCA)
- Swiss Federal Roads Office (FEDRO)
- Swiss Federal Office for Spatial Development (ARE)
- Swiss Cantonal Police Forces
- Swiss local authorities
- TRAFINEO GmbH & Co. KG (Germany)
- Transport Certification Australia (TCA)
- Transport for Greater Manchester (United Kingdom)
- Transport for London (TfL, United Kingdom)
- Tricubes Berhad (Malaysia)
- Walloon Ministry of Transport (Belgium)
- and others

About Us



Rapp Group – a single provider with a full range of services

Rapp is a Swiss planning and consulting group that leads the field in the sustainable development of living space and the environment. With around 450 qualified engineers, architects and technical specialists, we offer holistic services in six fields of expertise: Building, Organisation & Technology, Supply & Disposal, Traffic & Transport, Site & Environment and Surveying & Billing.

Excellent teams develop innovative solutions for complex customer projects and bring a keen awareness of their fiduciary responsibility to working relationships based on mutual respect. This ensures that we remain the first choice for customers and employees even after almost 120 years. All of the companies in the Rapp Group operate a Quality Management System certified in accordance with ISO 9001.

Rapp Trans – shaping smart mobility solutions

Rapp Trans focuses on international traffic and transport consultancy services, providing independent advice and support to clients. With around 80 employees, we offer our services in six fields of expertise: ITS Services, Traffic and Mobility Planning, Traffic Models, Freight Transport and Logistics, Transport Economics, Public Transport and Fare Associations.

Rapp Group (Headquarter)
Hochstrasse 100
4018 Basel
Switzerland
T +41 58 595 77 77
www.rapp.ch

Rapp Trans AG
Güterstrasse 137
4018 Basel
Switzerland
T +41 58 595 77 77
trans@rapp.ch

Rapp Trans (DE) AG
Potsdamer Platz 11
10785 Berlin
Germany
T +49 30 2589 4039
info@rapp-trans.de

Rapp Trans (NL) B.V.
Nicolaas Witsenstraat 10
1017 ZH Amsterdam
The Netherlands
T +31 20 737 15 20
info@rapprans.nl