

Better times begin in your head

2011

This year's illustrations are a tribute to railway workers: Often working alone – many of them outside in all weathers – they constantly make decisions to guarantee our day to day punctuality and safety.

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Preface

In the past year, we have all been confronted with reports of crises and of crisis meetings whose results each time were valid for only a few days. One read about the sovereign debt crisis and the euro crisis, about deflation, recession and many other fears, accompanied by violent exchange rate swings. A countless series of commentators made inflationary use of the word crisis to see – and perhaps even invite – the coming of the next crisis.

An individual company could do nothing against such macroeconomic waves. The decisive factors were whether the ship proved stable enough and whether the crew proved equal to the challenge of steering a safe course through these turbulent currents.

With pride, pleasure and relief we are able to say: Our ship and crew survived the storm, and with 10 % higher turnover they did so quite well. Our revenue structure contributed to this significantly. The proportion of licence and maintenance fees for the Viriato software – i.e. for investments that we made long before 2011 – has been continuously growing. This helped us compensate for the collapse in margins for our consulting services due to currency rate changes.

Just as important as the year's solid financial results for our long-term development are non-quantifiable values such as ongoing training, employee development, organisation, and research and development. The industry sector in which we work is also a long-term business. Starting with the idea for a new railway line, its planning, design, approval and construction requires anything between one half and two generations. This process is somewhat faster for rolling stock, but it will have to remain in operation between 10 and 40 years. These timescales contrast sharply with the usual product cycles of a few months or years in the fashion, telecommunications and automobile sectors.

About 20 years ago, when Switzerland found itself in a difficult economic situation with high unemployment, a large advertising agency launched a billboard campaign with the title Better times begin in your head. This slogan is still valid today. Uncertain surroundings will continue to accompany us. We must keep our heads clear and cool, anticipate future needs and trends, take advantage of opportunities and create with our activities an environment of mutual trust.

Better times begin in your head!

Planning and politics

The year of this report, 2011, reminded us once again how closely the realm of transport, including the railway world, is intertwined with national and international politics. Fortunately, the days are past in which railway construction mostly obeyed military reasoning. Today the market, i.e. the demand for passenger and freight transport, is seen as the main force guiding the development of transport networks. But this theory is only half the truth. Given that direct revenues from passenger and freight transport services cover only part of their costs, government is generally required to assume overall responsibility for the construction of transport networks. The political process thus produces the fundamental decisions. These involve not just quantifiable arguments such as expected transport demand and corresponding costs, but also other aspects such as better geographic accessibility for outlying or thinly populated regions, and a desire to protect the environment and society's resources. Sometimes, however, it is possible that these projects occur simply to take advantage of financing and other benefits that are consequences of the broader political process.

This setting again shaped our work in 2011. We were confronted with a large number of tasks, many of them in the context of political decisions. The problem statement always lay somewhere between the two extremes of "What should be built where?" and "How can current or planned infrastructure be operated as efficiently as possible?" In no other transport system are infrastructure and operations so intertwined as on the railway. These questions always involve great sums of money that burden current or future taxpayers. In a discipline so dominated by politics, keeping one's internal compass steady is not easy.

Our activities as experts for the Stuttgart 21 project yielded an extraordinary situation. We suddenly found ourselves in the spotlights of the German press: our opinions and comments were sought on the basis of rumours, leaks and partial results. For a while, work would have been impossible without a rigorous information embargo. Even after the public presentation of our results and numerous interviews and statements, interest remained high. In this context, it was nearly impossible to keep the technical and political aspects separate.

The referendum that approved the German state of Baden-Württemberg's help in paying for Stuttgart 21 brought the mediation phase – and thus our responsibility vis-à-vis the public – to a close. For us, this was a difficult but instructive experience to be in a conflict situation of a kind that can always arise, although usually not with this virulence. In the future, we will follow our usual policy: Unless otherwise agreed, the rights to the use of the results of our studies and expert evaluations belong to our clients. They decide what information they want to provide to the public.

This does not keep us from helping our clients benefit from our experience in the realm of public communication. Indeed, the French "public debate" process has taught us that open communication increases credibility, which contributes to good solutions with sensible compromises. Our task will continue to be to communicate complex situations to our clients in a comprehensive, simple and clear way.

A few guiding thoughts are relevant here. The railway, and somewhat more generally public transport, can significantly contribute to the quality of life, to the protection of our environment and to the conservation of our natural resources. In the context of objectives set by the political process, our task as specialists is to determine and communicate the technically best system solution including institutional and financial aspects. We help our clients see possibilities for improvement, even when they are convinced at first that another variant is best. We will never call a political decision into question. We can show in advance project benefits and thus help contribute to political decisions in a way that is both comprehensive and compatible with the system. The basis for this is an open dialogue between our rational world, which knows the system's technical traits, and political representatives whose planning horizons go beyond the next election.

We look back with pride on the long series of projects whose success stems in small or large part from SMA's contribution. Our experience also includes projects that failed, either because they could not be financed or because they disappeared from sight for some other reason. As in world history, learning from the lessons of the loser can be as instructive as from those of the winner.



Projects and products

In the 2010 Annual Report, we assigned our reference projects to eight different strategic areas. This year, we have compressed this structure into the following five areas: railway system planning; service planning and optimisation of operations; process consulting; Viriato and products; and IT services.

The central question is always when, where, how often and how fast trains should run in the future. This is generally called the timetable. In fact, however, this question involves a process that lasts years and sometimes decades and ends shortly before the start of operation of a complete and fully developed timetable.

The choice of each technical element – be it along the line of route, in stations, in rolling stock or in the signalling system – helps shape the final timetable. The infrastructure planning phase is already decisive for run times, line and station capacity, train headways and on-time performance. In this sense, the “timetable” is a long process chain with numerous evaluations and intermediate decisions that affect the overall result.

Such a process must occur in appropriate phases. The precision (and the corresponding required data density) must reflect the requirements of each phase of the production process. The choice of planning tools and the corresponding amount and quality of input data are thus of central importance.

All our studies and the employed IT tools are elements of this long process chain.

Viriato

Viriato redesign The migration of Viriato onto a new platform started at the end of 2008 and is SMA's biggest IT project ever. It is thus a central element of our corporate strategy. Its purpose is to secure Viriato's situation in the long term. The project focuses on implementation of a modern software architecture, the use of contemporary technologies and methods, and the development of know-how within the company.

Large software projects are often associated with planning difficulties and high risks. For example, essential requirements often emerge late in the project, qualitative problems go unnoticed for too long or project management fails to take low productivity seriously enough in early phases. Difficulties and departures from the project plan are often recognised too late.

In order to address the risks in a targeted way and to make difficulties visible early, we have identified five important project elements: team, process, management, users and quality. As a result of the project's disciplined implementation, it is now 80% finished with no budget or deadline overruns. We will present the migrated version of Viriato to the public as planned in September 2012 at the InnoTrans trade show in Berlin.

- **Team** A team that functions well is essential for any successful project. We have attached great importance to having our team work in a stable roster dedicated to this project over a long period. With a high degree of self-organisation, the team members can make even difficult decisions among themselves, since they have the best information for many complex questions.
- **Process** From early in the project, we have used an agile development process called Scrum that guarantees a self-responsible and self-organised team and an integrated process of continual improvement. Scrum offers a good balance between greater flexibility in mid-term project management and a clear focus in the implementation of individual iterations.
- **Management** Scrum's short iterations make continuous planning a must. This gives a team who have been working on a project for some time an exact view of the work yet to be done. The iterative approach also allows the speed of development to be gauged at frequent intervals. Project managers recognise departures from the plan early and can take corresponding actions.
- **Users** Functionally, Viriato is a well-developed product and has been used at SMA for many years in countless projects. Making available the implicit and explicit knowledge that already existed within the company was therefore important. Regular discussions of the requirements for specific modules and frequent presentations of the current state of development allowed early involvement of the users and prevented costly development errors.

- **Quality** High code quality is central to this development project. The product must remain maintainable and extendable over many years. Also, fast and efficient work is only truly possible when development of new extensions introduces no errors in functions that previously worked correctly. We have therefore built a testing infrastructure that automatically checks the different quality attributes. This includes over 2000 automatic unit and integration tests, performance tests and checks of architectural integrity. In addition to this automation, regular code reviews in the group and in pairs of developers promote know-how transfer and a collective quality consciousness in the team.

These elements have proved their worth in the migration project. The resulting structures and skills can also be used and further developed in the future. They guarantee that our clients benefit both from the essential hands-on skills of software engineering and from the professional and successful conduct of large and challenging software projects.

- **Viriato.ENTERPRISE** Under this working title, in 2011 we began the implementation of two large extension modules. The first model extension involves infrastructure versioning, which allows holding different planning horizons in a central database. This supports the long-term timetable development process, which potentially lasts multiple years, within one application in an integrated way.

The second functional extension enhances Viriato's train model, which now supports a differentiation of service offerings. It loosens the rigid fixed-interval model underlying Viriato. In the future, this will allow simpler and more efficient handling of trains whose interval, for example, is fixed on only part of their route.

Railway system planning The following projects had a long-term horizon, with a corresponding large impact on future infrastructure. In all projects, the task was to create additional capacity for rising demand in systems that were already heavily used and extensively interlinked. Exact requirements concerning the operational process, train headways and precise run time calculations accompanied infrastructure planning from the start.

- **Network-wide service concept for Switzerland's Rail 2030 project** In a project for Swiss Federal Railways (SBB) and the Swiss Federal Office of Transport (BAV), SMA is developing a timetable concept for the whole of Switzerland in the context of the infrastructure improvements of the Strategic Rail Infrastructure Development Program (STEP). The concept is based on regional modules and contains long-distance, regional and freight traffic. It forms the basis for the cost-benefit evaluation.
- **Master plan for Geneva and cross-border RER trains between France, Geneva and Vaud** As a follow-up to several partial, country-specific studies on both sides of the border, we conducted an integrated, cross-border study of the development of services and infrastructure improvements for the area encompassing the Swiss cantons of Vaud, Geneva and neighbouring France. Parallel to this we carried out for SBB Infrastructure several detailed technical studies for a master plan for the Geneva transportation node. Finally, in anticipation of the planned 2017 opening of the cross-border metropolitan-area rail network (RER), we developed plans for each implementation phase and corresponding updates of the timetable.



- **Schaffhausen S-Bahn** In order to increase the attractiveness of the Schaffhausen metropolitan area and to deal with increasing travel demand, the transport master plan for the area foresees upgrades to public transport, including a metropolitan-area rail network (S-Bahn). Investments in the electrification of the DB line in Klettgau, in new stops and in selective improvements to the existing infrastructure will let the planned S-Bahn serve the whole canton of Schaffhausen every half hour and the urban centre every 15 minutes in rush hour.

- **Long-term strategy for the Railway of the Wyna and Suhre Valleys (WSB)** The two national programs known as Future Development of Rail Infrastructure (ZEB) and Rail 2030 foresee a significant improvement of service in the Aarau–Zurich corridor. As a feeder railway for Aarau, the WSB needs to know the most economical way of handling an expected 50 % increase in travel demand. SMA developed a long-term concept that will provide the basis for the financing of improvement measures and for WSB's development strategy.

- **Second Paris–Lyon high-speed line** The high-speed line between Paris and Lyon, which opened over its full length in 1983, is reaching the limit of its capacity. Consideration is thus being given to building a second line that would run in a corridor to the west of the existing line and permit many new itineraries. As a basis for planning this line, SMA developed a conceptual timetable and carried out a number of capacity checks, particularly for the Lyon node and the Paris–Bordeaux high-speed line.

- **Strategic service planning in western and south-western France** In 2017, the two new Le Mans–Rennes/Angers and Tours–Bordeaux high-speed lines will enter service. This will bring significant service and timetable changes. In this context, SMA developed several alternative timetable concepts, which in particular define the additional infrastructure improvements required for the new operations.

- **Further development of the Aix-en-Provence–Marseille corridor** The service between Aix-en-Provence and Marseille was already significantly improved in 2009 thanks to the operational launch of several double-track sections. For additional development scenarios extending to 2040, we created additional combined construction and service plans that propose long double-track sections and reopening of the Aix–Rognac line. This would enable regional TER trains to serve the Aix-en-Provence TGV station.

- **Service and construction planning in southern Alsace** The planned opening of the second phase of the TGV East and the Rhine-Rhone TGV lines in 2017 will increase travel demand. This makes infrastructure improvements necessary elsewhere, particularly in the Strasbourg metropolitan area. SMA is carrying out a capacity study that also takes into account forecasts for freight and regional trains and allows precise definition of the needed infrastructure work. This includes the long-term projects for a line to Basel-Mulhouse airport and enlargement of Strasbourg station.

- **Study of the Cologne rail node** As part of timetable concepts for various time horizons, we analysed the bottlenecks that mark the infrastructure of the Cologne railway node. On this basis, infrastructure improvements were proposed for distinct time periods that will allow the Cologne node to handle future requirements.
- **Long-term planning for DB Netz AG** The planning for a country-wide system path catalogue for the German infrastructure operator DB Netz AG was completed for passenger and freight trains in 2011. This defines bottlenecks and corresponding mitigation measures that will be submitted to the political financing process.
- **Donau-Iller S-Bahn system** For the Donau-Iller regional S-Bahn system in Germany, SMA developed a multi-level service and operating concept. In this concept, the S-Bahn provides local service with frequent trains, modern rolling stock and attractive trip times. Higher-level express trains are to run more systematically and, thanks to various improvements, shorten travel time between larger centres. These regional and inter-regional train services – which are distinct from long-distance services – had to be integrated within the transport concepts of the German states of Baden-Württemberg and Bavaria. The study yielded recommendations for infrastructure improvements, particularly in Ulm station.

Service planning and optimisation of operations Many SMA projects involve optimisation of services and/or operations within a pre-defined setting. In addition, in many studies, our clients expect an evaluation and visualisation of the effects of timetable changes on demand, travel times and geographic accessibility. For this purpose, we use the Viriato extension modules for demand estimation, travel time analysis and geo-visualisation.

These evaluations require little additional effort and provide examples of how the productivity of planning work can grow: Efficient support with IT tools allows additional and more comprehensive results in the same time period.

Just two decades ago, a country-wide redesign of rail services in a large European country was virtually unthinkable. Today, thanks to corresponding IT support, we are standing at the threshold of coordinated European-wide timetable and infrastructure planning.

- **Service and operational study for the Bergen Railway in Norway** On the internationally known Bergen Railway from Oslo to Bergen, long-distance and freight trains run over the whole line and local trains offer additional service in the Myrdal–Voss–Bergen area. The objective of a study requested by the Norwegian Railways' passenger division was to identify proposals for short-term quality and stability improvements and mid- and long-term measures for the line's strategic development. The conceptual proposals, which were developed with a capacity analysis in Viriato, were to be verified in a second phase with a dynamic simulation (using OpenTrack).

- **SBB rolling stock strategy for international services** Taking into account long-distance, regional and freight traffic, SMA developed alternative service concepts with both tilting trains and conventional rolling stock in anticipation of the opening of the Gotthard base tunnel in December 2016. The analysis describes both advantages and drawbacks for each option, and thus supports decision making in the rolling stock strategy for international services.

- **Cross-border timetable study for Jura as part of Phase 2 of the “Romandie Concept”** In a first phase starting in 2013, the Romandie Concept will further develop and improve the timetable offering in the region of Lake Geneva and between Lausanne and Bern. In a second phase, the task will be to solve various problems by integrating the Jurassian arc. In an assignment from BAV and SBB, SMA conducted a study and proposed an integrated service concept that is coordinated with both the Romandie Concept and the French requirements across the border. There, the study took into account the reopening of the Delle–Belfort line and Rhine-Rhone TGV services toward Paris, Lyon and Strasbourg.

- **Support for service planning in the Broye–Seeland area in Switzerland** In the Broye–Seeland area, a planner is confronted with every imaginable difficulty: four affected cantons; three train operating companies; two linguistic regions; and several single-track secondary lines in a star pattern that mesh with the mainline SBB network. SMA supported our client in short- and mid-term timetable planning and in identifying infrastructure improvements needed for further service development.

- **Development of an Airport Express “Light” via the east corridor for better service to Munich airport** Infrastructure improvements between Daglfing and Johanneskirchen are a major prerequisite for better service to Munich airport. With an eye towards current developments in traffic levels and expected increases in demand, the task was to check whether short-term service improvements could be implemented quickly with either the current infrastructure or only minor upgrades.

- **Start of service on the “Diabolo” line to Brussels Zaventem** In Belgium, we participated in the work for the major timetable change of December 2013 at the start of service on the Diabolo project, a newly built rail line to Brussels’ Zaventem national airport. The planning is marked by numerous constraints: financial, institutional, but also technical factors and the available capacity on the rest of the network. In its detailed planning, our client – the Belgian National Railways (SNCB) – was able to make use of SMA’s strategic study from 2010.

- **Simulation of the “Lyon West” network (lines from Lyon Saint-Paul to Brignais, Sain-Bel and Lozanne)** The French rail infrastructure operator RFF asked SMA to carry out dynamic simulations of the so-called Lyon West network from December 2012, when the tram-train was to start running. The simulations let us compare the robustness of various timetables. The analysis of the results then enabled us to propose changes to the timetable and in technical operations for better robustness.

Process consulting The quality of the railway as a system is almost exclusively determined by the quality of its processes. The particular challenge in railway operations is to combine organisational and business processes with the most efficient possible technical ones – while of course respecting all safety requirements. Railway operations are confronted daily with unforeseeable events of natural, human or technical origin. At times without such events, operations can be automated to a great extent. However, when unforeseeable events arise a system can only provide quantitative and qualitative support for decisions on a case-by-case basis.

A question that must always be answered is thus: How much infrastructure is needed in order to maintain reduced operations after a disturbance, or to return to normal operations within a pre-defined time?

■ **Emergency procedures for S-Bahn systems** S-Bahn systems are usually based on a common trunk route in the core of the metropolitan area, covering all lines. Given the high interval density and the short headways between trains, disturbances in this central section usually have serious consequences for the whole network. Emergency procedures contain operational instructions for each kind of disturbance that enable maintenance of the timetable to the greatest possible extent. SMA has developed the emergency procedures for the Munich S-Bahn, amongst other networks. Other studies we have performed have shown that planning for operational disturbance management must begin at the design phase of a new section of infrastructure (such as Munich's second trunk line) to ensure that it has adequate inherent capacity.

IT services Over the years, each railway company develops its own, specific processes. No software, no matter how complex can be implemented everywhere "off the shelf". A central trait of Viriato and ZLR, our train runtime calculator, is that as platforms they can be implemented in a wide variety of settings. They can be integrated via interfaces within company-specific process workflow requirements. This flexible implementation process yields much lower development and maintenance costs than producing new developments from scratch. We offer our IT services in this context.

■ **DB Personenverkehr AG: Timetable lifecycle management project (FF)** After a multi-level, EU-wide call for tenders, we won the assignment to deliver a new path-planning system for the passenger division of Deutsche Bahn (DB) in Germany. The marketing strategy of DB's passenger division includes an increasing differentiation of services and the creation of work corridors for network maintenance. This is making the timetable development process significantly more complex for them. The supporting IT process must be functionally extended into a planning system that allows the evolutionary development of train paths over their entire life cycle. Integrated evaluation functions allow the planner to check the quality and cost impacts of their plans and thus to optimally shape the timetable in line with stakeholder needs.

The contract includes program licences for 300 users, a 30-month project for the development of functional extensions, and maintenance and update of the software for 10 years. Viriato forms the core of the system, which given its migration onto a new platform now stands at the start of a new product cycle.

■ **SBB Infrastructure: Project to replace train run calculator (AAFD)** For some years now, SBB's dispatching and timetable development systems have been using the train run calculator (ZLR) developed by SMA. The objective of the IT project AAFD is to definitively replace SBB's 25-year-old predecessor system for the calculation of run times, which was still used for a few analysis cases. In this project, SMA supported SBB from the design phase onward and is now adding an analysis and visualisation application to the ZLR system. This enables combined studies in the areas of train headways, train run time comparisons, signal spacing and speed restrictions – with one single tool.

■ **SBB Infrastructure: Project for adaptive train driving (ADL)** SBB's ADL project seeks to avoid unplanned train stops at signals. The train driver receives an early recommendation to drive at a lower speed so that by the time he reaches the signal, it is showing a green aspect. This reduces both energy consumption and train delays.

As part of this project, we developed a program to estimate potential energy savings. With the help of the train running calculator ZLR and on the basis of archived real-world data, the tool calculates the energy consumption of all past train runs and compares them with a hypothetical run without unnecessary stops. The results show that energy consumption could be reduced by about 2 % with no impact on running time.

To enable SBB to make even better use of this potential, in a follow-up project we are now developing an extension of ZLR to calculate train run profiles that are optimised for energy use.

One could call 2011 an intermediate year for marketing: it saw no major event such as the InnoTrans trade show in Berlin and no Viriato user conference. Behind the scenes, however, work was proceeding apace on the company's future public presence. Under preparation are new brochures, a revamped website and a company presentation that communicates the variety of our consulting and IT activities in a more focused and clearer form.

The near future holds a full series of events:

- the InnoTrans trade show in Berlin on September 18–21, 2012
- presentation of the redesigned Viriato during InnoTrans
- the 25th anniversary of SMA und Partner AG in October
- the IT13.rail congress on January 17–19, 2013, at the Swiss Federal Institute of Technology (ETH) in Zurich

Like its predecessors, IT13.rail promises a rich program revolving around scientific studies, practical applications and field observations. Thursday will be devoted to science. Friday will focus on the work of the four companies – including SMA – who are organising the conference. We want to display the full spectrum of railway operational planning processes: from long-term network development through to annual timetable creation to on-the-day supervision of train movements, we will focus on the appropriate degree of precision for each planning phase and on the IT tools this requires. On Saturday, we plan a tour of the new SBB dispatching centre at Zurich airport and a backstage look at Switzerland's largest airport.

Presentations, lectures and conferences in 2011

April 5	San Sebastian (Spain)	Presentation on the Swiss transport system at the conference "El sistema de movilidad de Gipuzkoa"
May 5	Zurich	Contact day at the Swiss Federal Institute of Technology (ETH) in Zurich
May 5	Lausanne	Lecture at the Swiss Federal Institute of Technology in Lausanne (EPFL): "Les chemins de fer à voie métrique dans le cadre du système suisse de transports publics"
May 18	Brienzen (Switzerland)	Presentation at a meeting of the narrow-gauge railways: "Die Schweiz im Taktverkehr mit Bus und Bahn erleben"
May 25	Berlin	Lecture and student exercise event at Berlin Technical University: "Einsatz von Viriato in der Fernverkehrsplanung"
June 23	Zurich	Presentation at the StabilMobil conference on complex transport systems as a societal challenge (a joint event with ETH and the University of Zurich): "Anschluss verpasst? Hat der Taktfahrplan eine Zukunft?"
July 13	Bregenz (Austria)	Leadership of the workshop "Entwicklung des Bahnverkehrs im Grossraum Bregenz unter Berücksichtigung der Anbindung an das benachbarte Ausland"
September 22	Cologne/Düsseldorf	Presentation: "Verkehr im Rheinland" as part of the Rhineland regional summit
November 8	Zurich	Visit of a US rail-sector delegation organised by the Swiss embassy in Washington; joint workshop on the topic, "Swiss Mobility System and Integrated Rail Network California"
November 23	Lyon	Lecture: "Horaire cadencé et exploitation ferroviaire" at the French national engineering school for public works (ENTPE)

Publications

Documents of the StabilMobil conference of June 23, 2011	Anschluss verpasst? Hat der Taktfahrplan eine Zukunft?
SER 01/2012*	Fahrplan-Revolution in Frankreich
SER 01/2012*	Netgraph Timetable Switzerland 2012
SER 01/2012*	S-Bahn Schaffhausen

*Schweizer Eisenbahn-Revue: published in December 2011



Personnel

Specialists and personalities At SMA, growth does not simply mean producing the same thing 2000 times rather than 1000 times. For us, growth mainly means new employees, people, specialists and personalities, with an organisation and processes to accompany them – within a well-established company culture under steady further development.

The days are over when companies could choose among a large number of well-trained candidates. Today, at contact days with the universities, during guest lectures and in internet portals, we present SMA as an organisation in which talents can emerge and develop. Many current employees got to know SMA during an internship and then joined us at the end of their studies.

Ongoing training We pay particular attention both to recruiting new employees and to personally coaching and managing employees in their daily work and in special situations. A part of this is ongoing training at all levels, from top management and supervisors all the way to the younger employees. And the statistics on hours worked by employees only shows part of the truth: for us, each trip, whether for work or private purposes, is a chance for observations, comparisons and new ideas that naturally flow into the world of work. SMA is a fascinating professional setting indeed.

Changes in top management The changes in top management completed at the start of 2010 were short-lived. The departure of CEO Giuliano Montanaro in 2011 required new adjustments. Eric Cosandey took over management of the planning area, while company founder Werner Stohler temporarily assumed the combined role of CEO and president of the board of directors. Our company coach, Reinhard Vissa of the company Vissa Consulting, was engaged as an external contractor with some responsibilities in the human resources area.

Arriving and departing employees At the end of 2011, SMA had 59 employees. The year 2011 saw the departure of seven employees and the arrival of 15 others. The new employees come from five different countries.

New employees in 2011

January 17	Helena Matos	Master's degree in engineering	Planning
February 22	François Périllon	Master's degree in transport and regional planning	Planning
June 1	Rolf Würth	Master's degree in geography and master's degree in software engineering	IT
Juli 1	Felicella Tedeschi	Master's degree in political science	Back office (returned to SMA)
August 1	Ulrich Leister	Master's degree in engineering	Planning
August 1	Rafael Haas	Master's degree in engineering, ETH Zurich	Planning
September 1	Benjamin Ernst	Master's degree in computer science, ETH Zurich	IT
September 1	Markus Ullius	PhD in computer science, ETH Zurich	IT
September 1	Ramon Rey	Engineering student	Planning
September 1	Robert Siegel	Master's degree in engineering	Planning
September 15	Lukas Schwab	Master's degree in computer science, ETH Zurich	IT
October 1	Matthew Holliday	Master's degree in engineering	IT
October 15	Olivia Anders	Master's degree in transport	Planning
November 1	Michael Kästner	Master's degree in economics	IT
November 28	Barbara Schwander	Bachelor student in applied psychology	Back office

The following people left the company in 2011: Burkhard Franke, Christoph Inhelder and Giuliano Montanaro (all in planning), Alexandra Ramuz (human resources), Kerim Jabbes (services), Nadia Neuhaus (back office) and Dorothea Deli (student employee).

Employees in 2011 At the end of 2011, SMA's staff presented the following profile:

	Head-count	of which PhDs
Bachelor or master's degree in engineering	32	
Bachelor or master's degree in mathematics or computer science	12	3
Other university training (geography, regional planning, economics)	6	
Bachelor's degree from universities of applied sciences	2	
Interns	3	
Administration	4	
Average years of work experience	9.8 years	
Average years at SMA	5.9 years	
Average age	35.8 years	
Absences due to illness in 2011	0.83 %	
Flexibility of employees (average number of hours worked in 2011)	100.70 %	
Flexibility of the company (average portion of full-time position held)	89.30 %	

The proportion of non-Swiss nationals has again grown and is now 42 %. Employees come from seven countries; the neighbouring countries Germany and France dominate with a total of 19 people.

Interns In line with our traditions, we again took responsibility for a number of interns. They gain a view of the working world and the culture of a company, and usually complete an internship project on a current topic. Their work on data and their investigations generate ideas and input that often enrich our conversations with existing and future clients.

In 2011, the following interns worked at SMA:

Sittipan Rainold (Germany)	Internship project: "Kurz- und mittelfristig umsetzbare Angebots-optimierung des öffentlichen Verkehrs für die Stadt Winterthur auf der Grundlage der 4. Teilergänzungen der S-Bahn Zürich"
Adrien Despoisse (France)	Project for master's degree: "Planification intégrée de la maintenance et des horaires"
Udo Maximilian Strehlke (Germany)	Semester project: "Rollende Landstrasse (RoLa) durch den Gotthardbasistunnel (GBT) als Folge der geplanten Sanierung des Strassentunnels"
Adrian Ioan Gurau (Canada)	Internship project: "Connection of the north and south stub stations in Boston and development of a strategic concept for commuter and metropolitan-area services based on transversal lines"
James Karrer (Switzerland)	Internship project: "Angebotsoptimierung im Raum unter Berücksichtigung alternativer Überlegungen für einen Tiefbahnhof Luzern"
Joël Flückiger (Switzerland)	Internship project: "Aide aux études de planification pour la région de Genève et la France"

Study trip to Ljubljana and Trieste A long tradition for our annual study trips is to visit places and countries that lie outside the mainstream of tourism. For 2011 we decided to do something unusual: in a star-like pattern, by rail or by air, travelling with or without detours, the SMA team converged on May 12 in Ljubljana, the capital of Slovenia.

The Slovenian Railways welcomed us warmly. We learned about the difficult environment in which the railways of the former eastern block still operate. The continuation of our trip from Ljubljana to Koper, the Slovenian port on the Mediterranean, provided a chance to learn by observation. Before World War I, this line was part of the Vienna–Trieste corridor, then one of the most important rail lines in Europe. Today, freight transport in the hinterland of the new port of Koper is still of some importance, but passenger trains have become nearly meaningless: on the new, parallel motorway, the trip lasts an hour, whereas the train needs two and a half. In addition, travellers to Trieste in Italy have to change in Koper to a bus: for reasons of profitability, the Italian Railways have discontinued international trains here. This is not the look of a united Europe!

Our next encounter, with the city of Trieste, was fascinating: pulsating *italianità* in a city whose architecture, as in Ljubljana, recalls the Danube Monarchy. Another friendly encounter with a business partner was with Professor Giovanni Longo, of the transport group within the University of Trieste's civil engineering department, and his team, with whom we have already worked on several projects.

Social events On an autumn weekend, employees and members of their families met for a hike through the vineyard hills of Lavaux. Weather and mood were outstanding, and after the hike a good number of participants dared a plunge into Lake Geneva, which was still warm from the summer.

On December 11, 2011, the day of the timetable change, we had two good reasons for a TGV ride from Zurich to Dijon and back to Lausanne. We celebrated not just the biggest-ever timetable change in France, to whose overall concept and international coordination we had significantly contributed, but also the opening of a new high-speed line for which SMA – just after its founding – had supported regional lobbying efforts in the line's conception phase with arguments based in both politics and planning.



Financial results

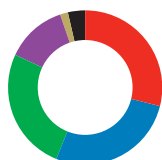
Budget objectives reached With a turnover of over 11 million Swiss francs, we were able to grow by some 10 % despite an economically turbulent year. We currently earn about 70 % of our revenues in the euro zone. If the exchange rate between euros and Swiss francs had stayed as it was at the start of 2011, we would have achieved over 15 % growth and surpassed the budget objectives set at the year's start.

Growth as a corporate model Growth is not simply a question of athletic ambition or a vain drive for size. Even our sector, with its long-range view, is obliged to undergo permanent change that calls for corresponding know-how and IT tools. The scope, complexity and challenges of these tools are steadily growing and the corresponding investments can only be financed on the basis of a broad clientele. Another driver in this development is the long-term and ongoing increase of the value of the Swiss franc vis-à-vis other currencies. Only those who increase both quality and productivity at the same rate can resist this pressure.

Key figures in millions of Swiss francs	2011	2010
Gross turnover	11.08	10.14
Expenses and external services	0.78	0.87
Net turnover	10.30	9.27
Turnover per employee (on the basis of 52.7 full-time positions)	0.21	0.21

Turnover by country

■ Switzerland
■ France
■ Germany
■ Belgium
■ Norway
■ Various



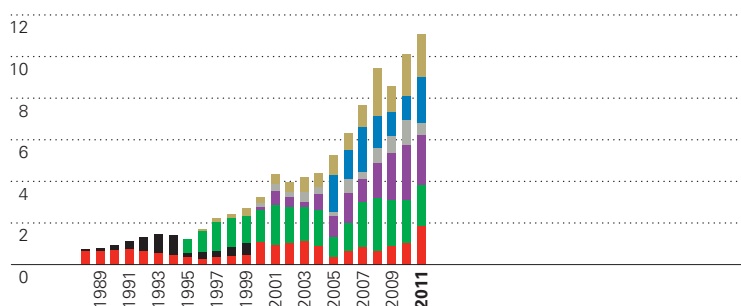
Turnover by client category

■ Rail infrastructure managers
■ Integrated railways
■ Transport operators
■ Public agencies
■ Private companies



Development of turnover
1988–2011
(millions CHF)

■ Viriato
■ IT
■ International
■ France
■ Germany
■ Other foreign countries
 until 1999
■ Switzerland



Outlook and thanks

As this annual report appears, we stand at the threshold of SMA's 25th anniversary.

As planners of events with strictly timed processes (in contrast to construction projects for example), we have a special relationship with time. Our thinking is always multi-dimensional: in two dimensions for line planning and in three for the planning of whole networks. But one of the dimensions is always the time axis. Its values are always positive. It faces forward, and there is no going back. The processes repeat themselves: weekly, daily, hourly or every few minutes. Everything has its own rhythm. A trip is always also a metaphor for life – countless poets have written about this analogy.

But we remain in our technical world. We are pleased about the many successfully completed and implemented projects. They give us the strength and confidence to take on the tasks that will arise in the future and to develop constructive solutions – time and again.

The board of directors and management would like to thank all our clients, project partners and employees for their great and steadily reaffirmed trust, which will continue in the future to inspire us to exceptional achievement.

Zurich and Lausanne, May 2012

Werner Stohler



Employees in 2011

Board of Directors



Management Board



Planning and Operations Division Heads of department and Customer Managers



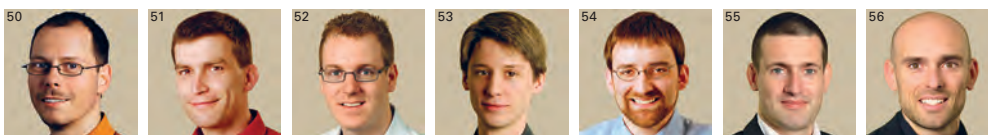
Employees



IT Division Heads of department and Key Account Manager



Employees



Back office



- 1 Werner Stohler
chairman of the board
of directors and CEO
- 2 Cécile Grünenfelder
Stohler
chief financial officer
- 3 Peter Weber
- 4 Dr. Thomas Bickel
head of IT
- 5 Eric Cosandey
head of planning
- 6 Georges Rey
partner
- 7 Warner Oldenzien
- 8 Frederik Ropelius
- 9 Philipp Schröder
- 10 Luigi Stähli
head of office in
Lausanne
- 11 Olivia Anders
- 12 Cyrill Bärtsch
- 13 Andreas Berchtold
- 14 Carolina De Boni
- 15 Michael Frei
- 16 Rafael Haas
- 17 Clément Haller
- 18 Pascal Joris
- 19 Pierre Ka-Wai Ho
- 20 Raphael Karrer
- 21 Patricia Kottmann
- 22 Simon Landureau
- 23 Ulrich Leister
- 24 Marten Maier
- 25 Helena Matos
- 26 Daniel Mäusli
- 27 Gösta Niedderer
- 28 François Périllon
- 29 Carole Raynard
- 30 Stefano Regazzoni
- 31 Lukas Regli
- 32 Ramon Rey
- 33 Robert Siegel
- 34 Daniel Wipf
- 35 Claudia Wirz
- 36 Florian Zumkley
- 37 Hans Rudolf Akermann
partner
- 38 Elie Arnal
- 39 Matthew Holliday
- 40 Björn Glaus
- 41 Christian Grosse-Wilde
- 42 Michael Kaestner
- 43 Markus Apell
- 44 Alain Bosonnet
- 45 Dr. Dan Burkolter
- 46 Matthias Cavigelli
- 47 Benjamin Ernst
- 48 Martin Gämperle
- 49 Armin Häberling
- 50 Steve Hauffe
- 51 Joachim Rubröder
- 52 Michael Schuler
- 53 Lukas Schwab
- 54 Robert Simons
- 55 Dr. Markus Ullius
- 56 Rolf Würth
- 57 Lulu Leanza
- 58 Maria Miceli Gozalo
- 59 Barbara Schwander
- 60 Felicella Tedeschi

April 2012	Conclusion of a survey and evaluation project of traffic demand in Aurich, Germany
March 2012	Roll-out of the new Viriato version based on the .NET software architecture to the SMA Planning department after a year of extensive tests Assignment from the Federal Railroad Administration (FRA) for consulting in the frame-work of a workshop on "the development of a service-oriented planning methodology for improvements on the Northeast Corridor" (Boston–New York–Washington) Sale of a Viriato licence to COWI, Hungary Assignment from the California Department of Transportation (Caltrans) on capacity and service optimisation of freight and passenger trains in the San Joaquin Corridor between Oakland and Bakersfield
February 2012	Provided expert opinion on an alternative project for a new high-speed line between Paris and Normandy at the request of the "National Commission for Public Debate" Assignment from the Federal Railroad Administration (FRA) to provide technical assistance in developing rail network integration concepts for the first phase of the California High-Speed Rail project Presentation on "The role of timetable strategy in the planning of rail infrastructure investments" in Karlsruhe, organised by the French rail infrastructure operator RFF
January 2012	Presentation during the Passenger Rail Committee of the Transportation Research Board in Washington, D.C. on "Could California Benefit from a Swiss Approach to High Speed Rail?" Assignment on project communication for the Aurich-Emden Railway: enlargement of the loading gauge to the Emden sea port and reactivation of local passenger services SMA won a large order for a train path management system from the passenger division of Deutsche Bahn (DB) in Germany after a European-wide tendering process Visit of a delegation of the Railway Technical Research Institute (RTRI) of Japan
2011	Development of a model for the socio-economic evaluation of fixed-interval timetables in collaboration with Setec International
December 2011	Completion of a study for the Limmat Valley Railway estimating the potential demand Receipt of an assignment to develop the future workshop concept of the southeast section of German Railway's regional passenger train division (DB Regio Südost) Final presentation of the optimisation study for the Pforzheim S-Bahn network, Germany Presentation of service and operational concepts for the Nuremberg S-Bahn Presentation of the public transport strategy of the Swiss canton of Nidwalden for representatives of towns and other stakeholders Commencement of an operational study for the reopening of the border line between Pau and Zaragoza
November 2011	Sale of Viriato extension modules and training to Servizi per la Mobilità in Rome Timetable and operational concepts for a "rolling motorway" in the Gotthard base tunnel during the closure of the road tunnel for the Swiss Federal Office of Transport (BAV) Visit of a delegation of representatives of US railway companies and public agencies (arranged by EDA, the Swiss Federal Department of Foreign Affairs) Visit by a delegation of the departments for train paths and information systems of the French rail infrastructure operator RFF

	Assignment for a study in the “mid-Rhine corridor” together with the consulting firms Infraplan and BVU from the German Federal Ministry for Transport (BMVBS)
	SBB’s IT project AAFD ordered the extension of the ZLR system originally developed for SBB to replace their existing train running time calculator
	Participation at a workshop on the technical feasibility of the High Speed 2 line in the UK
October 2011	Receipt of an assignment from RFF to structure the national timetable for the start of operation of ETCS level 2 on the Southwest and Atlantic high-speed lines
	Presentation of results for improvement of services to Frankfurt airport (working with DB Netz) at the Rhine-Main public transport agency (RMV) in Hofheim
	Sale of two Viriato licences including the running time calculation extension module to Norwegian Railways (NSB)
	Conclusion of the long-term planning study for the German network (DB Netz 202X)
	Development of contingency procedures for the Munich S-Bahn network for the 2012 timetable year
September 2011	Visit of a delegation of representatives from UK rail stakeholders (arranged by EDA)
	Adaptation of the Viriato database for the Jura Railways (Switzerland), including their bus lines; design of timetable layouts for the canton of Jura’s timetable
	Study for the combined scheme involving both Lindau stations in anticipation of the electrification of the Lindau–Geltendorf line
	Completion of the OpenTrack simulation of operations on the “Lyon West” lines; evaluation of several scenarios and proposing a catalogue of improvement measures
August 2011	Completion of the long-term planning project Bavaria 202X for the Bavarian public transport agency (BEG)
	Planning for the Allgäu diesel-powered network in an assignment from BEG, with the Austrian state of Tirol and the public transport agency of Baden-Württemberg (NVBW)
	Conclusion of the study for the creation of engineering timetables for refurbishment of the tunnels on the Paris–Caen line
July 2011	Viriato demonstration and training at the train operator Trenitalia SpA in Rome
	Purchase of Viriato licences by the Fribourg public transport agency (TPF)
July 29, 2011	Public presentation of the Stuttgart 21 project “stress test” audit results
June 2011	Start of improved rail service planning project for Munich airport via the east corridor
	Study of the Cologne rail node for the Rhineland public transport agency (NVR GmbH)
	Operational concept and demand estimation study for the Bremgarten-Dietikon Railway
	Timetable variants for the reopening of the Chartres–Voves line in France
April 2011	Completion of a 15-minute interval timetable study for the Frauenfeld-Wil Railway
	OpenTrack training for Jeffares & Green (Pty) Ltd in Cape Town, South Africa

List of abbreviations and key organisations

BAV	Bundesamt für Verkehr Swiss Federal Office of Transport
Caltrans	California Department of Transportation, USA
COWI	COWI Consultancy
DB	Deutsche Bahn AG German Railway
EDA	Eidgenössisches Departement für auswärtige Angelegenheiten Swiss Federal Department of Foreign Affairs
EPFL	École Polytechnique Fédérale de Lausanne Swiss Federal Institute of Technology, Lausanne, Switzerland
ETCS	European Train Control System
ETH, ETHZ	Eidgenössische Technische Hochschule Swiss Federal Institute of Technology, Zurich, Switzerland
FRA	Federal Railroad Administration, USA
NSB	Norwegian State Railways
RER	Réseau Express Régional Metropolitan-area rail network, France
RFF	Réseau Ferré de France French railway infrastructure manager
S-Bahn	General term for a metropolitan-area rail network (abbreviation for “Stadtschnellbahn”)
SBB	Schweizerische Bundesbahnen Swiss Federal Railways
SNCB	Société Nationale des Chemins de fer Belges Belgium National Railways
TER	Train Express Régional French regional trains
TGV	Train à Grande Vitesse High-speed train
ZLR	Zuglaufrechnung SMA's running time calculator

Editorial services

SMA und Partner AG, Zurich
science communications GmbH, Zurich

Visual Concept

Eggmann-Design, Wernetshausen

Printing

Druckerei Feldegg AG, Schwerzenbach

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