



# INFORM

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Image source: KASIG

## BREAKTHROUGH FOR LOCAL TRANSPORT

### ARCHIEVE YOUR BREAKTHROUGH WITH TTK-PROJECTS

With the breakthrough of the “Kaiserstraße” tunnel in September 2015, the city of Karlsruhe reached a milestone. The realization of “lowering” the main rail axis through the city, combined with the creation of an additional parallel rail track along the “Kriegsstraße”, is on its way. Having an overall construction period of 10 years for the so-called “combined solution”, every successful progress is good news for the continuing success of the “Karlsruher Modell”.

The last edition of TTK Inform occurred almost one year ago. Since then, TTK as not only been involved in the development of local transportation projects, but has also widen its portfolio spectrum thanks to new successful “breakthroughs” projects in Germany, Austria and France, which will be presented in this edition. The vehicle procurement for the Wieslauftalbahn shows what kind of challenges Regioshuttle operators will face in the future.

Further east and in cooperation with partners, a study was conducted in the Salzburg metropolitan area, focusing on a rail connection between the region and the city, following the idea of the “Karlsruher Modell”.

Furthermore and as shown in Nantes, the simulation of rail operation with the software “Open Track” provides many answers to questions and problems in terms of design and development of rail networks. Finally, the relocation and construction of a new central station in Rouen provides many urban opportunities. In that city, TTK currently simulates the demand data and thus the basics of any further planning with a VISUM-traffic model.

Have fun reading!

## OPTIMIZING OPERATIONS OF THE TRAMLINE 1 IN THE CITY OF NANTES

From August 2014 to February 2015, TTK supported SEMITAN, the network operator for buses and trams in the city of Nantes, within the framework of a technical assistance in operational questions. TTK's support was based on a network dynamic modelling with the software OpenTrack.

Nantes' current 3-line tram network has faced a lot of developments since its opening, and above all, a strong passengers' increase. Line 1, between stadium "La Beaujoire" in the north-east area and "François Mitterrand" in the west neighbouring city of Saint-Herblain is the most successful of the three lines, with an average ridership of 120.000 passengers per day.

In order to meet this high demand, this line is operated since 2006 with additional trams to offer more frequent services in the city center, up to three minutes headway.

### HIGH PERFORMANCE OPERATION THROUGH DYNAMIC SIMULATION

Since 2007, line 1 is split up into two branches at each terminal side to strengthen tram services on a common section of 19 stops. This new operation concept has lead the operator to test different kind

of timetables, without providing, until now, the optimal solution to guaranty a strong and reliable running of the line.

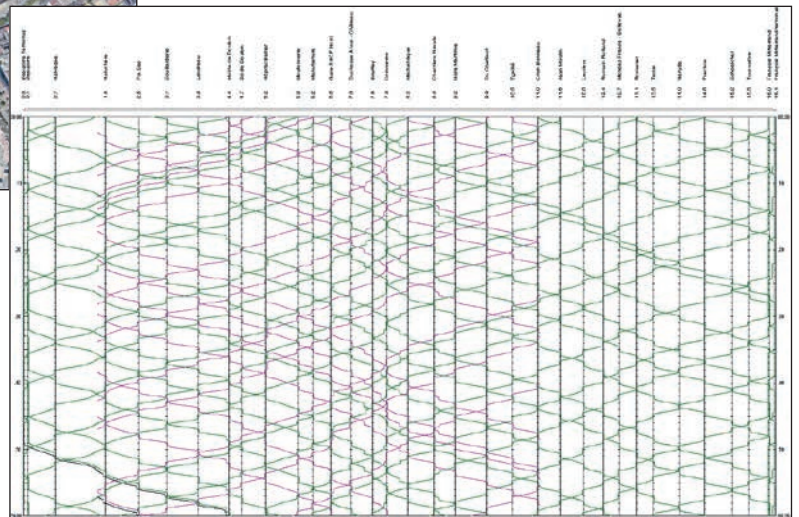
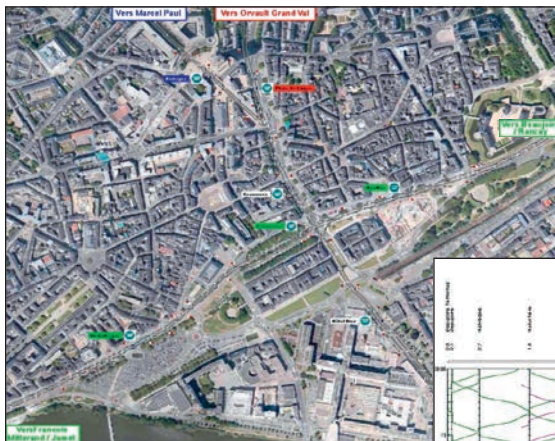
Dynamic simulation allows recreating in details the reality, especially the variability occurring in the real life: each tram runs with its own specific conditions (travel time, dwell time, driver's behavior, road crossing with a more

or less high priority level, turn-back time, etc.). All these "stochastic parameters" can be integrated in a model to run many successive simulations which will all be different from each other. With this powerful tool, a whole operation's week can be simulated.

To optimize the current line's operation, a complete modelization of line 1 has allowed to try "virtually" new operation's scenarios, with strong and trustful results. First, the current running's state has been analyzed based on the ITCS data given by the operator for the model's calibration. Travel, dwell and turn-back times have been subtly studied, as well as the bunching effects which are often occurring during the day to day operation. Thanks to the precise analysis results, the model has been configured to match to the closest the real line operation.

Once this work has been done, the model has been used to test new operation scenarios, proposed by TTK in close collaboration with the SEMITAN. Each one of them has been evaluated after running multiple simulations, focusing on the punctuality at major stops, the delays at the terminal stops and the forming of bunching effects. More precisely, TTK's team has studied the punctuality and its related impact on the rolling stock needed to operate the line. One developed scenario shows that it could be possible to spare one vehicle, but also to have a more stable and regular operation (with a certain reduction of the bunching effect).

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- Left: model screen shot of the city center with the central crossing point at Commerce (meeting place of lines 1, 2 and 3)
- Right: train diagram after calibration including bunching effects

## VEHICLE PROCUREMENT WIESLAUFTALBAHN

North-east of Stuttgart the non-electrified single-track branch line of the WieslaftalBahn connects several municipalities in the Rems-Murr-Kreis. Today the WieslaftalBahn is the backbone of public transportation in this region. Via Schondorf the line is directly connected to the S-Bahn and thus to the state capital. Thanks to these positive circumstances the "Zweckverband WieslaftalBahn" was created and after the "Deutsche Bahn AG" planned to decommission this line, it took over the line in 1992. The municipal entities take special care about their vehicles which are lovingly called "Wiesel".

Nonetheless, because of technical development as well as up to date needs and requirements in terms of comfort and accessibility, operators face increasing problems with an ageing rolling stock. TTK was already commissioned with the feasibility study for the electrification of the line and received in a subsequent step the order for the rolling stock procurement. The goal was to find either modern used or new vehicles with diesel power as well as alternative technology, which are inexpensive to purchase and maintain, and could provide a high degree of comfort to the passengers.

TTK gathered the client definition and requirements for new as well as for used vehicles, led numerous technical discussions and meetings with self-propelled unit manufacturers and looked for second-hand vehicles on the



German market. This led to an alarming result: all manufacturers withdraw from the market of "smaller" diesel vehicles. The clear trend is towards electric drive technologies with new future-oriented battery systems. Each provider currently develops its own solution, following different charging technology. In addition no vehicles are available on the second-hand vehicle market which puts even more pressure on the situation. The subject will remain relevant in the following years, as it will bring challenges to many municipal operators as well as to rail infrastructure planners, not only in the southwest of Germany.

Three options emerge for the WieslaftalBahn: a) to keep on operating with the well-maintained existing vehicles b) to buy new diesel vehicles on a very limited market or c) to have an ambitious vision and rely on the new electric technologies.

Whatever the option is, TTK will continue to bring advice and technical support to the "Zweckverband WieslaftalBahn" in the next stages of the rolling stock procurement.

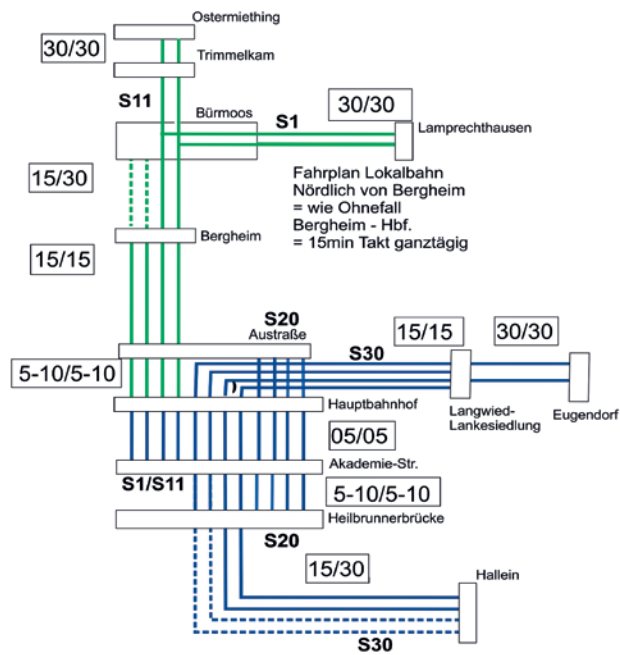
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## EUROREGIO SALZBURG- BAVARIA-UPPER AUSTRIA

The economic feasibility study financed by the European Regional Development Fund (ERDF) for new railway lines of the cross-border European region of Salzburg Bavaria-Upper Austria was conducted in 2014 and presented to the public in 2015. Studies were led by an international and multidisciplinary team formed by PTV, Herbrich, Traffix, and the university of Graz in cooperation with TTK.

The first mission focused on the elaboration of a new regional rail network in line with the specific needs of the city of Salzburg, combined with a metropolitan public transport axis, aiming at accessing to the city center without modal interchange for travelers from suburban areas, according to the Karlsruhe model of tram-train. Regional lines have been prioritized based on a cost / benefit Analysis. As recommended by the study, the first step will be the implementation at the same time of an underground crossing of the old town and a new regional line to Hallein.

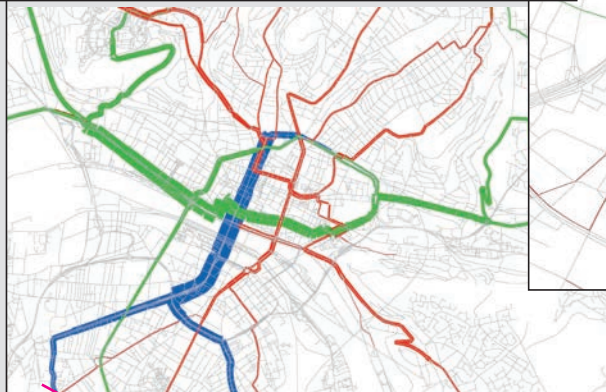
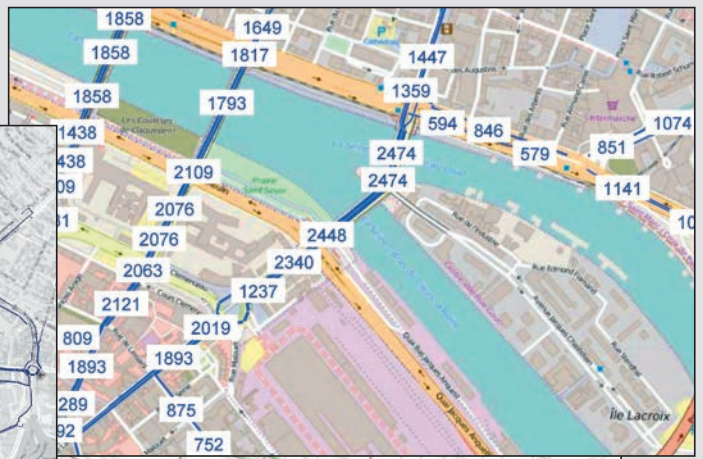
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● Timing map

● ... et Vélo (échelle quartier gare)

● Affectations 2030 MAP (échelle centre-ville) ...



● Affectation 2030 sur le réseau TC de référence



● Affectations différentielles réseau VP avec / sans gare

## ➤ ROUEN NEW CENTRAL STATION: WHAT MULTIMODAL ACCESS IN 2030?

To meet the anticipated growth in rail traffic, the agglomeration of Rouen, Haute-Normandie region, the state and SNCF study for 2030 the creation of a new central station on the site of St-Sever freight station. How can one imagine its future multimodal access on foot, by bike, by car and public transport in 2030?

In 2015, the city of Rouen commissioned TTK to estimate and modelize the ridership volumes in 2030 for all modes (private car, public transit, walking and cycling) and thus derive guidelines for planning the program, organization and design of future networks. 8 scenarios were developed with assumptions regarding road access to the station and the new neighborhood, new tram lines and busways, network of bike lanes and pedestrian paths. Each scenario has been modeled and compared to the others, using the software VISUM (PTV Vision ©).

This prospective study allowed to verify the feasibility of planning assumptions related to the travel projections 2030, with high implications and expectations for a large pedestrian area around the future station, a new combined pedestrian, cycling and public transport bridge crossing upon the Seine and a special interest to pinch

the main roads to reduce all access flows towards downtown, combined with a better use of the future motorway.

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