STEP

Short Term Prediction

**Funding:** European

**Duration:** Oct 2011 - Nov 2012

**Status:** Complete with results

**Background & policy context:**

A critical element of making better use of existing road capacity is the prediction, in virtually real time, of short-term future traffic conditions, so that adjustments can be made to controllers such as traffic signals and Variable Message Signs, and information can be provided to drivers to stay away from incident areas and avoid the onset of gridlock. Real-time modelling is perceived to be highly specialist, expensive and data hungry; however, across Europe a number of Traffic Control Centres (TCCs) already operate supported by considerable sophistication in the prediction tools. These systems are provided by a plethora of suppliers, depend on a variety of data sources, with high maintenance cost and use a range of alternative forecasting algorithms, software and hardware, whilst the user interface is generally bespoke. These barriers stop the National Roads Authorities from collaborative learning from each other’s mistakes and successes, as the constraints and idiosyncrasies of each individual implementation are probably too great to encourage joint innovation.

**Objectives:**

STEP (Short TErm Prediction) is a project that has been designed to explore and hopefully overcome many of these institutional barriers, with the ultimate aim of implementing and testing a robust solution for real-time traffic modelling in an operational environment, based on generally available data, with lower maintenance costs. We have agreement with two TCCs in two countries so that we can apply our short-term prediction tools in practice and test their reliability and usefulness for operators. Barriers to innovation are overcome by running the short-term predictions remotely, removing the need to install new software and hardware in the TCCs. The risk to existing operation will be minimal; but the possible gains are considerable.

If successful, the two implementations will form the basis for the production of trans-national standards and specifications for implementation in Traffic Control Centres across Europe, including the design of user-friendly interfaces easing the understanding of dynamic information.

The project team consists of respected academics, consultants and operators from a number of European countries who collaboratively provide all the required know-how to achieve a system that aligns with best practice, is deliverable across Europe, and is low cost in data inputs and maintenance. In addition to established organisations our consortium includes an exciting new small size enterprise.

**Parent Programmes:**

ERA-NET - European Research Area Net

**Funding type:** Public (EU)

**Other programmes:** CEDR

**Other countries:** Belgium, Switzerland, Germany, Netherlands, Norway and United Kingdom

**Partners:**

Chris van Hinsbergen, Fileradar, The Netherlands

Chris Tampère, Katholieke Universiteit Leuven, Belgium

Monica Mendez, ETH Zurich, Switzerland

Hans van Lint, Technische Universiteit Delft, The Netherlands

**Organisation:** Mott MacDonald UK
Key Results:

The project “STEP” (Short TErm Prediction) has explored issues relating to the implementation of short-term traffic prediction in TCCs. The project results are aimed to be transferable. The project started in 2011 and its field trial in the regional TCC in Utrecht has recently been completed. The short-term predictor was operational for five months, and used by staff managing the motorway network in the Netherlands’ congested centre. Separately, a test-bed was similarly developed for the South West of England, although this was not used in operations.

The actual predictor that was tested was developed by Fileradar. The principal objective was not to test the quality of a single predictor in a real-life situation or to compare between alternative predictors. Instead, the intention was to make a predictor available for actual TCC staff to use in their day-to-day work, to investigate what the obstacles are to its success, and to gain a better understanding of whether we could remove some of these issues.

An initial state-of-the-art overview of short-term forecasting systems was undertaken including a literature review of current traffic prediction models and short-term forecasting models. This included a review of multiple applications of short-term prediction systems in Europe focusing on a number of EU cities. It should be noted that it was not easy to find information about the practical applications. The majority of applications so far have focused on providing current state information to users. Although many existing software applications can detect incidents, often they cannot distinguish between recurrent and non-recurrent congestion. Moreover, there seems to be an insufficient insight into the relation between data quality (accuracy, reliability, timeliness, completeness) and estimation / prediction quality, that requires further attention to increase acceptance of short term prediction in TCC operations.

This close co-operation with the TCC management and users helped to provide a clear indication of the essential aspects of short-term prediction that affect its use and acceptability. These include the following:

- It is important that the actual traffic flow prediction is of a very high quality, as TCC staff considered only the first 15 minutes to be of adequate quality to serve their needs. (The deterioration after longer lapse times were found to prevent the predictions being used for longer term forecasts);
- The preferred option for the presentation of prediction results selected by TCC staff was found to be through use of a split screen with actual traffic levels and animated predicted situation shown side-by-side;
- Data transfer latency is critical when implementing short-term prediction tools, with TCC staff often comparing predictions with existing real-life data that they are used to seeing on their screen. The data volumes are significant when compared with real-time traffic data because each updated prediction contains not just a single snapshot in time but a series in time from now into the future. Considerable time was spent on streamlining communications elements of the system so that staff felt comfortable with the outputs.
- Non recurrent traffic congestion and quantitative descriptions of that (in terms of minutes delay, length etc) were the most interesting, but also the hardest to achieve; and
- The provision of an aggregated graph showing the average and current total km network queue.

Documents:
- Project description

STRIA Roadmaps: Other specified
Transport mode: Road transport
Transport sectors: Passenger transport, Freight transport
Transport policies: Societal/Economic issues
Geo-spatial type: Other