STEP – Short TERm Prediction

26 & 27 September 2013
ENR Mobility Final Conference, Vienna
**Objective:**

- Implementing and testing a representative solution for real-time traffic modelling in an operational environment, using generally available data, leading to generic advice for TCCs Europe-wide

**Partners:**

- Mott MacDonald (UK) – *Co-ordinator*
- Fileradar (NL)
- Katholieke Universiteit Leuven (BE)
- ETH Zurich (CH)
- Technische Universiteit Delft (NL)
STEP - Work Packages

- Project designed to explore barriers to implementing short-term prediction in TCCs
- Number of sequential Work Packages proposed to deliver STEP
- Main aim is implementing and testing a robust solution for real-time traffic modelling in an operational environment
- Project results aim to be transferable through knowledge gained through STEP to support wider needs for European deployment
• **Key aims:**
  
  – Establish a better understanding of the operational short-term prediction requirements in Traffic Control Centres
  – Exploring the gaps between the state-of-the-art and requirements of operators
  – Central to research work was delivery of a real-life trial conducted in an operational traffic management centre environment:
    • testing the prediction tool against user requirements *while learning valuable practical lessons during implementation.*
Work Packages 1&2: State-of-the-Art & User Requirements

- **Summary of objectives:**
  - Review of state-of-the-art
  - Gain better understanding of the operational short term prediction requirements of traffic managers at TCC’s
  - Exploring requirements of operators in terms of functional application, interfacing and the success of existing TCC tools

- During Jan - March 2012 meetings/discussions took place with TCC contacts in the UK, Netherlands and Belgium

- Attempt to secure more views through use of online survey and other media (LinkedIn contacts)

- Total of 15 responses obtained on user perspectives
TCCs have a positive attitude towards short-term prediction.

- 80% optimistic about the use of short-term predictors
- 50% considered ability for scenario generation additional useful,
- 50% stated that prediction accuracy was a key issue:
  - important to demonstrate successful results initially and then develop predictors with scenario generation at next stage
- 75% wanted to see evidence of successful application by other TCCs and also experience of real-life trials
- 75% stated cost of was a key concern, incl the cost of data acquisition
Work Package 3

• Summary of objectives:
  – Development of tools
  – Enabling linkages to other data sources than currently used
  – Development of user interface
  – Implementation of control measures
  – Improvement of reporting measures
  – Leading to readiness for STEP field trials

• Included new deliverable - WP3B:
  – Traffic Data Interface
Objective:
- Identify data requirements and interfacing standards
- Assess benefits of short-term traffic prediction availability

Keypoints:
- Software Dante written in Java and accessible via browser
- Dynamic Traffic Flow Model (LWR)
- Maximum time lag in data (2.5mins)
- National TCC,
  - Supervises the 5 Dutch regional TCC,
  - Coordinates regional TCCs in case of large problems
  - Disseminate information to other channels
National TCC:

STEP tool is positioned alongside other TCC operational screens and always available to operators.
**Interfacing Aspects:**

- Building on the outcomes of research with TCCs - helped to identify the preferred option for presenting the predictive traffic information that best supported operational requirements.

- A variety of options were considered/ tried:
  - Presenting the predictions in a split screen showing two maps (current and predicted situation),
  - Visualisation of the remaining capacity on corridors and alerts when and where ‘spillback’ are forecast to occur at particular locations.
  - Showing predicted travel time delays for non recurrent situations
• **Evolution of predictor during pilot:**
  - Recent history was added to the animation so that a 40-minute history of traffic conditions and 20 minute prediction were shown in one single animation.
  - TCC staff wanted to see a **total network queue lengths plot** being built into the application showing total queue length as a function of the time and comparing it to the historic average queue length over the day.
  - Final interface enabled traffic controllers to have direct access to information on whether current day traffic levels were busier or less busy than average
• **Key findings – 1 (General):**
  
  – Operating staff sceptical about new tools (seen it all before); build trust by including management and end users
  – By including operating personnel, final interface was in the end well received and actually used in practice:
  – Split screen is beneficial:
    • Historic comparator between usual conditions, today’s conditions and predictor
  – To be useful, accuracy required in both predicted length of queues and speed of traffic
  – Show predictions ‘as is’ before offering scenario solutions when congestion occurs
• Key findings - 2 (General):
  – Current predictor only trusted for first 15 minutes, particularly in case of non-recurrent congestion (due to difficulties in predicting duration and severity of incidents)
  – Possible to estimate and operate predictor using routinely collected data
  – Delays in obtaining and transmitting detector data critical
  – Effective implementation through rich web client, avoiding complex interference with in-house IT protocols
Key findings - 3 (Data Issues):

– In the market research TCCs stated that there are concerns over the availability and cost of data.

– The Pilot proved that the amount and kind of data that is routinely collected from standard roadside detectors and through existing communication channels is of the kind needed for a short-term predictor to be developed and calibrated.

– Although the accuracy of the prediction was poor, the available data was considered sufficient both in availability and type of information.
Evaluation of Pilot Project

• Key findings – 4 (*TCC’s Perspective*):
  – TCC personnel experienced the start of the pilot as very positive:
  – Short-term traffic predictions are a long desired feature in the control centre;
  – Operators enjoyed the enthusiasm of the project in terms of speed with which feature requests were implemented in the client.
  – Traffic controllers were very happy with the fact that they had a direct influence on the software itself; usually new software is designed by others and presented ‘as is’; and
  – The resulting user interface was rated as of a good quality. Especially the dual map feature was experienced as user friendly and provided a good overview.
Lessons Learnt - 1

• A lack of user acceptance a significant barrier to success:
  – Involving personnel, managers and actual end users into the entire process from design to rollout can increase the chance of success
  – Important to get users on board with what can be achieved with predictions so that they fully trust the system: decision support tools can be built upon these
  – Authorities have limited resources and cannot accommodate complex configuration and maintenance activities
  – Prompt and effective technical support should be available
Lessons Learnt - 2

• **Technical Performance**
  – Data issues: TCC users expectations of data requirements are greater than actually needed. It is possible to utilise what available to support predictions
  – Quality: First 15 mins of ‘usable’ prediction quality - during the pilot the quality increased to a level that was sufficient predictive information for TCCs
  – There is a trade off between functionality and accessibility
  – Setting up takes time in terms of understanding what works and what doesn’t – quality of prediction improved during the pilot.
• **Fileradar build a new lightweight web client (Sept 2013)**
  – Low budget deployment and maintenance,
  – Animated network queue evolution:
    • 60 min historic, and 30 min prediction,
    • “Support ‘mental map’ of TCC personnel by showing the animated recent evolution and let them infer based on experience”

• [http://trafficcontrol.fileradar.nl](http://trafficcontrol.fileradar.nl)

• **Looking for 2 more Interested TCC’s:**
  – Contact: info@fileradar.nl
Thank you for your attention

Mark.Finer@mottmac.com
www.mottmac.com