Reminder: What is STEP?

- **Objective**
  - Implementing and testing a robust solution for real-time traffic modelling in an operational environment, based on 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

- Explore barriers to implementing short-term prediction in TCCs
- Sequential but interdependent Work Packages
- Main aim is implementing and testing real-time traffic modelling in an operational environment
- Project results aim to be transferable through dissemination plan recognising wider needs for European deployment
• A number of short-term forecasting categories can be distinguished:
  – Naive methods (using the current state or historic averages)
  – Parametric model approaches using traffic flow models or simulation
  – Parametric model approaches using statistical techniques (time-series models, regression, etc.)
  – Non-parametric approaches (neural networks, clustering techniques, etc.)
• State-of-the-art in Decision Support Systems – different functions:
  – Problem identification (detection and diagnoses)
  – Generation of possible solutions (also referred to as development of scenario generation)
  – Prediction, either pertaining to the prevailing condition or to a ‘what-if’ situation (scenarios)
  – Providing operators with advice (possibly based on preceding functions)
WP1 – Key Findings

- Insufficient insight into the relation between data quality (accuracy, reliability, timeliness, completeness) and estimation/prediction quality
- Insufficient insight into the relation between prediction quality and control effectiveness/performance
- Most existing applications focus on providing information, and not on the generation and assessment of control strategies
- Most of the issues seem to be related to data collection – including lack of integration protocols across different systems
- Most of the applications developed so far focus on providing information to users supported by relatively easy/efficient user interfaces (including link color-coding etc.)
- Current applications cover motorway links, motorway networks, and urban networks – there is no bias towards network type
- Although many of the existing software can detect incidents (i.e. congestion issues), often they cannot distinguish between recurrent and non-recurrent congestion (i.e. type of incident)
WP1 – Recommendations

– Need for short-term forecasting: Benefits of using predictions are evident with better information for the road authority and road-user
– Choosing between scenario-based (or case-based) approaches and optimization approaches is difficult as both approaches have drawbacks/benefits
– The relationship between the quality of the data and quality of estimations/predictions is not clear and it is recommended to investigate this further, as well as the extent to which data quality can be increased by advanced estimation and data fusion techniques
– Final Report submitted to PEB Dec 2011 and approved
• Summary of objectives:
  – 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
WP2 – Key Findings

• Summary of findings:
  – TCCs in general have a positive attitude towards the use of short-term prediction models.
  
    • Over 50% of respondents felt that predictors with the ability for scenario generation are considered most useful
  
    • 80% of respondents stated that they were optimistic about the use of short-term predictors to address problems of congestion
  
    • TCCs experienced with short-term prediction are still working on the installation of a workable system
  
    • Use of short-term prediction without scenario generation is already seen as an important asset
  
    • Just over half respondents stated that prediction accuracy was a key issue:
      – important to demonstrate successful results initially and then develop predictors with scenario generation at next stage
WP2 – Key Findings

- TCCs indicated that their staff in many cases are unaware of the possibilities of traffic prediction
- Only 4 of the 15 TCCs have experience with short-term predictions
  - Early stages of development and application – dissatisfaction with accuracy of the system, although too early to fully evaluate systems
  - Nearly 75% of TCCs stated that they wanted to see evidence of successful application by other TCCs and also experience of real-life trials
  - 75% of respondents stated that the cost of setting up short-term traffic predictors in their daily operations was a key consideration
- The deliverable for WP2 on User Requirements was approved by the PEB in August 2012, and feeds into WP3 and 4.
WP2 – Key Conclusions

• Key points:
  – TCCs revealed a positive attitude towards the use of short-term prediction models
  – The experience of TCCs with the practical use and application of these models is limited
  – TCCs that have experience with short-term prediction tools are still trying to identify how best to install a workable system
  – Beneficial to focus on such easier applications initially so that the TCCs can gain some positive experience with short-term prediction – then focus on elements such as scenario generation
  – Users appear divided on the type of different user interface although interested in alerting type interface as well as graphical representation of the predictions that are made
Work Package 3

• Summary of objectives:
  – Development of tools
  – Enabling linkages to other data sources than currently used
  – Development of user interface
  – Consideration of control and reporting measures
  – Leading to readiness for STEP field trials in WP4A and WP4B

• Included new deliverable - WP3B:
  – Traffic Data Interface Specification
  – Interface between UK Common Database system (in South West Regional Control Centre (SWRCC) and the Fileradar predictive system located in Delft (Netherlands)
Deliverable 3A – User Interface Specification

- Details the programmatic and data interface to be developed between Mott MacDonald’s Common Database system and the Fileradar data analysis and prediction system located in Delft.
- Interface supports transfer of near real-time traffic count data over an internet connection for predictive data analysis.
- It also deals with return of predictive data for display to users (TCC operators) within the SWRCC.
- The specification detailed both the transport mechanism and data formats for both directions of information transfer.
Deliverable 3B – User Interface Specification

- Mott MacDonald ‘Osprey’ product as basis for interface:
  - Enhanced to provide additional features on short-term prediction
- Use of Osprey provides a number of benefits:
  - Maximised use of existing product and technologies
  - Enabled focus on user interface aspects of short term prediction rather than development of new tool/products
  - Principles proposed for the STEP tool easily transferable to other tools and products
Key features of tool – taking account of WP findings:
- Use of colour-coded links overlaid on a map view
- Use of alerts/alarms to highlight abnormal conditions
- Minimise the level of manual intervention to aid operators
Work Package 4A – UK Pilot

• Summary of Objectives:
  – To evaluate to what extent the predictors that can be prepared using the outputs of WP1-3 are ready to meet the customer requirements defined in WP2.
  – In the pilot area, begin to deliver the operational benefits.

• Original proposed a number of key stages:
  – Agree pilot plan with management
  – Prepare data and mapping
  – Dynamic model calibration
  – Development of appropriate interfaces
  – Running with the ‘live’ predictor
  – Evaluation of the pilot

• Delivery programme extended until Jan 2013
Work Package 4A – UK Pilot

- Agree pilot plan with management:
  - Began to be developed through interface with the HA’s South West RCC

- Prepare data and mapping:
  - Historic data was obtained from HA for all relevant MIDAS site, from TRADS for all relevant trunk road TMU sites.
  - Road links mapped from NTIS and HA referencing schemes onto ITN road links for overlay onto standard map products.

- Dynamic model calibration:
  - Historic data from 2010 & 2011 used to provide an initial calibration of the prediction model.
  - Development of appropriate interfaces:
    - Preparation of easy to understand STEP and interface-use material for RCC staff to reduce thresholds.
• Discussions with the HA revealed **significant impacts on the original plans**:

  – HA’s Traffic Management Directorate (TMD) currently developing own approach to short-term prediction = **risk of confusion with STEP Pilot work**

  – Changing management of Area 2 to a joint venture of Atkins/Skanska from July 2012 = reducing interest in and value of introducing STEP tool in SWRCC

  – During July – September HA’s role in supporting Olympic Games (27 July – 12 August 2012) and
- New proposal put forward to HA:
  - Testing reaction to STEP tool and user interface through HA operators at Strategic NTOC in Birmingham)
  - Nominating a single point of contact within HA to act as a 'champion' to generate interest in the tool and to encourage different staff to use it

- Still in discussion phase with HA to agree how to deliver WP4A:
  - That maximises value of work undertaken to date
  - That fits with HA’s current ‘change programme’
  - That adds value to HA’s current work on real-time prediction tools

- New delivery timescale of Jan 2013
Work Package 4B – NL Pilot

- **Summary of Objectives:**
  - Provide insight of the requirements and standards for real-time prediction tool/interface
  - Assessment of the benefits of traffic predictions in the TCC and how they are utilised by personnel

- **Number of key stages:**
  - Preparing detailed pilot plan with TCC
  - Preparation of data to support prediction (including calibration)
  - Configuration of system (linking to the TCC system)
  - Running with the ‘live’ predictor
  - Evaluation of the pilot

- **Delivery programme extended until Jan 2013**
• Pilot in 2 TCCs – Utrecht, Netherlands:
  
  (1) VCNL:
  - National TCC: Supervises the 5 Dutch regional TCCs
  - Coordinates between regional TCCs in case of large congestion problems (rerouting)
  - Distributes traffic information to Service Providers which broadcast the information to consumers (radio, TV, RDS/TMC, internet, etc.)

  (2) VCMN:
  - Regional TCC for the Utrecht region
  - Main focus and responsibility is on incident management
  - TCC operates infrastructure (VMSs, tunnels, etc)

• Trial now live and visit planned
• **Trial phasing:**
  – Commenced mid Nov 2012 and will run until Jan 2013
  – Trials will include ‘halfway’ evaluation, where improvements are made based on TCC user feedback
  – Final evaluation (technical/user feedback) after trial ends

• **Technical Aspects:**
  – STEP Tool and Interface developed by Fileradar BV
  – Tool developed in Java
  – STEP Tool accessible via browser so no installation of software is required
  – Layout of interface designed together with TCC personnel
    • Each TCC allowed to customize interface for their own optimal user experience
Work Package 4B – NL Pilot

National TCC:
STEP tool is located alongside other TCC operational screens and always available to personnel

STEP Tool & Interface:
• Some technical aspects experienced:
  – Mainly cross-platform challenges and MacOS/Windows quirks
  – ‘Teething’ problems now been resolved – although anticipate few issues to crop up during initial period of pilot phase
• Initial feedback:
  – TCC operators appear to have a good level of interest in the tool but want to see it properly first
  – Some early feedback on interface aspects that have now been incorporated into current design
  – Not data yet on level of use – too early in trial to review this
• Summary of Objectives:
  – Production of **final report**, summarizing key findings and recommendations based on research activities and results of real-life trials undertaken in WP4A and WP4B.
  – Development of **specification** for real-time modeling for pan-European deployment and user friendly decision-support interfaces
  – Development and execution of a **dissemination plan** and activities, promoting outcomes of STEP study to potential end users involved in traffic management control.

• Dissemination plan for 2013 developed and under discussion
• Revised timescale – completion by end of February 2013
Thank you for your attention

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