TRANS-TOOLS ("TOOLS for TRansport Forecasting ANd Scenario testing") is a **European transport network model** that has been developed in collaborative projects funded by the European Commission. The TransTools3 (TT3) project updates the model database to 2010 as base year, replaces and improves various sub-models, and redesigns the overall software architecture to make the model faster and easier to use.

TRANSTOOLS 3

This fifth newsletter about the TT3 project describes the most important activities carried out between March 2013 and March 2015.

The TT3 project is up and running at full speed again after having been partly on hold for about a year due to a need for clarification of a number of data issues, a need for identifying alternative data sources and data validation approaches, and consequently a need for agreeing on a Grant Agreement amendment with DGMOVE.

The Grant Agreement amendment, including among other things an extension of the project duration, means that the project has now 9 months left to achieve its objective:

The development of the third upgraded version of the European transport demand and network model, TRANSTOOLS.

When finalised, the TT3 project will deliver a validated, well-documented and user-friendly model that will provide policy makers with a tool for assessing and developing better transport policies. The final TT3 model will be free, open, and more transparent than previous versions.

WHAT'S NEW IN THE PROJECT?

Two major activities have dominated the work with the TT3 project since the last newsletter:

- The redesign of the overall model structure;
- The collection and validation of the data foundation for the model development.

In addition, the data work has been documented in deliverable D5.2.

These three topics constitute the content of this newsletter.

REDESIGN OF THE MODEL STRUCTURE

The overall software architecture was redesigned compared to prior versions of TransTools in order to accommodate the user requirements in a better way. To provide better usability, some of these options require additional user software licenses. The user-interface is designed to meet the following system requirements:

- It is flexible and menu-driven;
- It is already implemented;
- It has been tested throughout the implementation of another model (The Danish National Transport Model);
- It provides an easy overview of data and tables.

Rather than spreading out data over many mdb-database files as in the prior TT versions, the new version adopts the approach successfully applied by the Danish National Transport Model, where all scenario data and all results are stored in a single SQL server database.

For larger organisations, the master database will typically be on a separate computer, which only houses this database. The master database handles all input scenarios and all results. This makes it easy to compare and combine data between scenarios – even from model runs, which were executed on separate computers, since everything is stored in one database. Networks use a master-network concept, where there is actually only one single network for all scenarios – with attribute data which manages active/non-active and changing attributes. This gives a far better basis for difference-maps and guards against inconsistencies in editing. This approach also makes a clear distinction between input and output data.

Another benefit of this new version is that a “scenario manager” is provided, which makes it easier for users to compare scenarios – and rerun scenarios if data are edited. This assists the user in managing project scenarios, i.e. comparing a base situation for different model years with a project or policy to be evaluated for the same year.

This overall framework has been implemented and is ready for use when all sub-models are finalised and validated. This will take place in the autumn of 2015.

DATA COLLECTION AND VALIDATION

Methodology

As originally planned, the ETISplus project – another EU project that ran partly in parallel with TT3 –provided the main part of the data foundation for the TT3 project. However, as the TT3 project progressed, it became clear that other sources also had to play a role in order to establish a solid data foundation for fulfilling the purpose of the TT3 model, as described in the following.

A comprehensive data collection, processing and validation process was initiated, including the development of an ArcGIS server web interface with the purpose of allowing for online checking, validation and correction of data by all TT3 partners according to their local experience.

Even though the main validation was distributed so that each partner had responsibility for one or more specific countries, there were also cross-cutting responsibilities - e.g. validation of inland waterways, air networks, or the freight rail network – for partners with mode-specific expertise.

Among the focus points of the validation were the road classes. In Figure 1 a screenshot is seen from an editing session. In general you would not expect many dangles for the motorway network; exceptions can be found especially around larger cities as seen for Luxembourg.

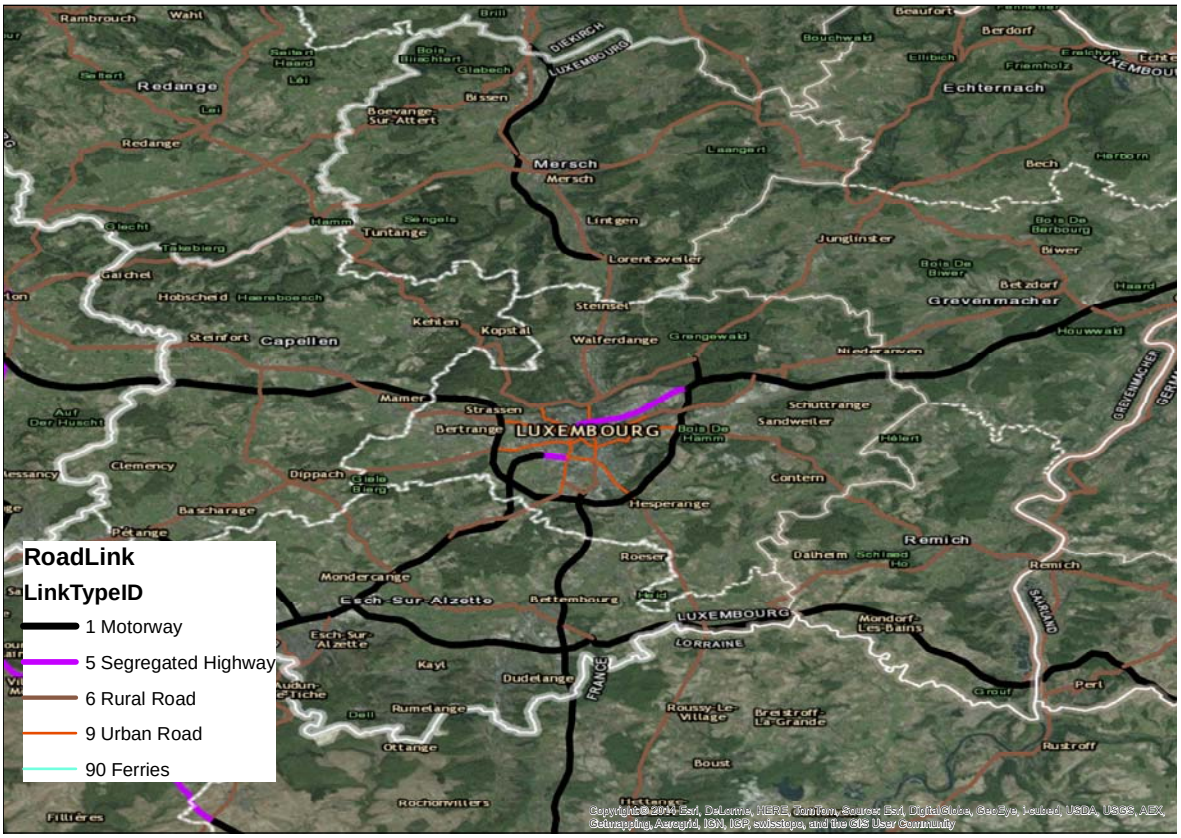

Figure 1 - Validation of road classes

However dangles in more rural areas are seldom correct.

Figure 2 illustrates the TT3 highway network (top map) where a missing link has been identified versus the actual highway network (bottom map) where there is no gap. Obviously, results based on the TT3 highway network will be erroneous if the gap is not corrected by inserting the missing links.

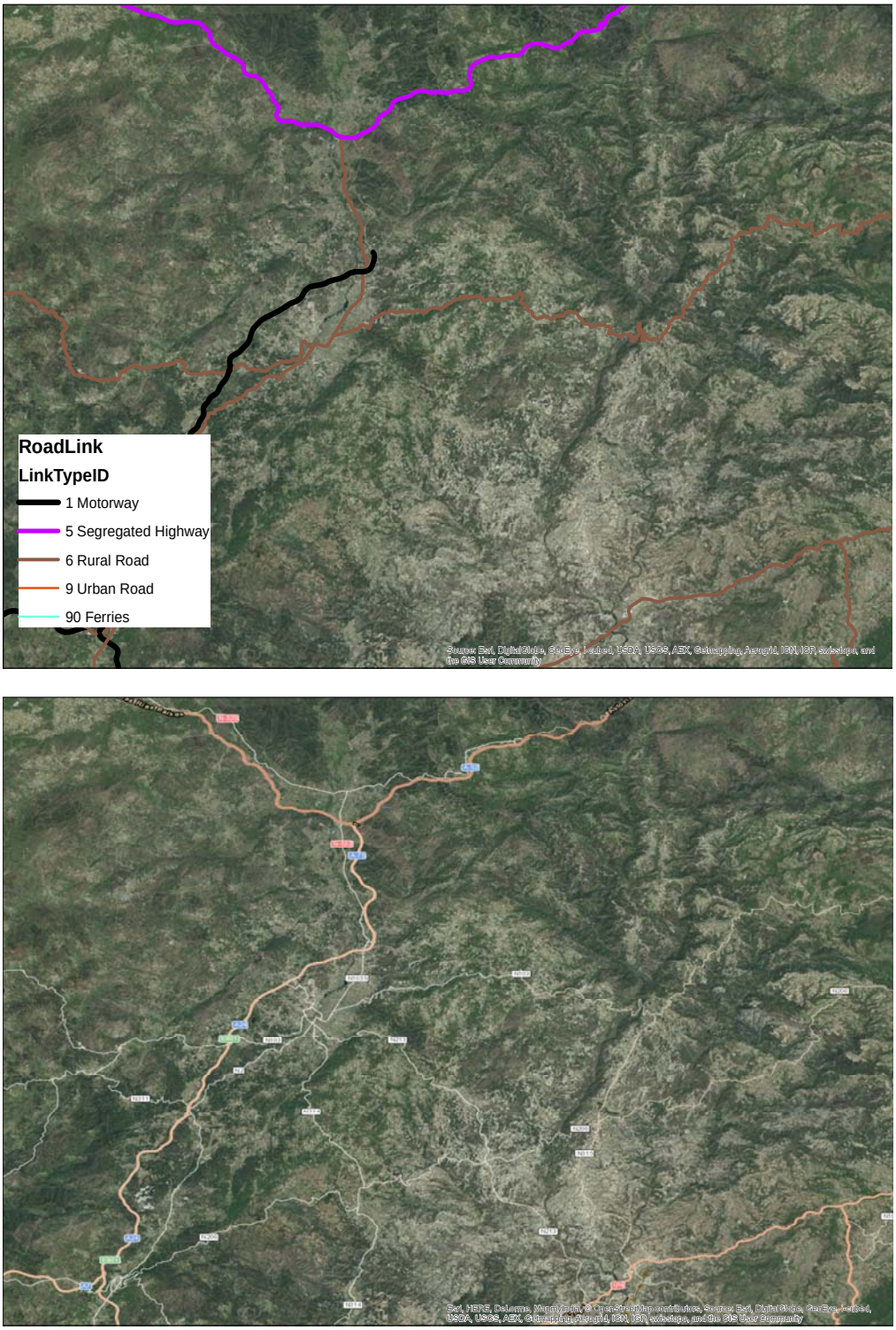

Figure 2 - TT3 road network with gap vs. real road network

To fill out the missing link a new link is drawn using the ArcGIS editing tools.

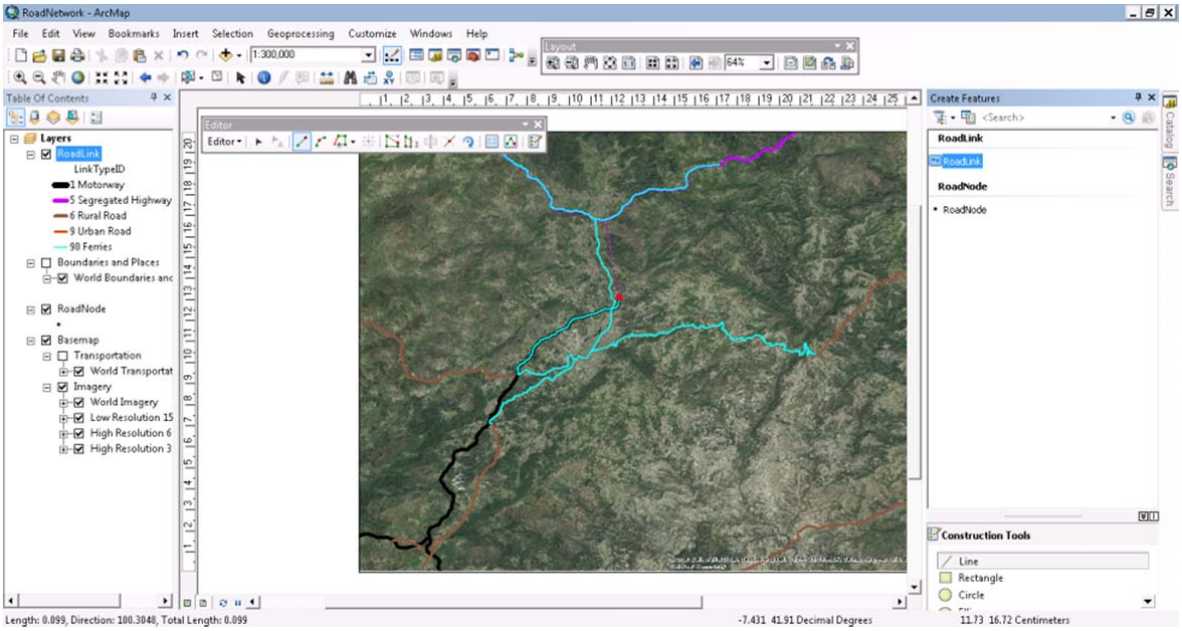

Figure 3 - Creating new links for TT3

After the link is drawn the link will have no attributes. Therefore an attribute table is opened and the relevant attributes are filled out for the new link.

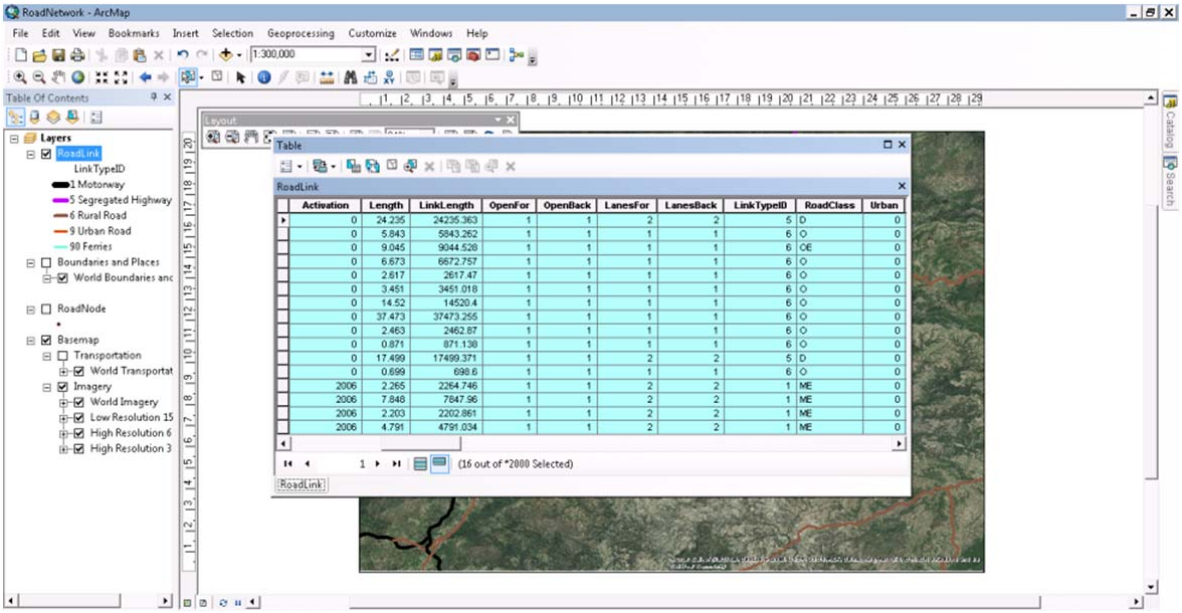

Figure 4 - Updating attributes in TT3

The data collection and validation work was finalised in the beginning of 2015 after which the consortium went on preparing and processing the networks to a coherent network ready for matrix calibration. The basis for the trip matrices also needed various sources in order to cover countries outside EU, as well as to supplement the passenger and freight matrices with car and truck (vehicle) matrices.

Hereafter, it is the plan that the level-of-service data will be available for the final model estimation to take place in the spring 2015 for both the passenger and the freight models.

In the later phase of the sub-model implementation, the implementation of the overall model framework will run in parallel (using preliminary uncalibrated versions of the sub-models for testing). This is expected to take place during the summer and until early autumn 2015. Finally, i.e. autumn 2015, the validation process will be carried out.

Model Zones

A crucial design issue when building a large European model is the definition of zones. While large zones will lead to aggregation errors, excessively small (and hence large number of) zones will lead to computational challenges. More importantly however, it is also quite difficult to collect and maintain data if zones are too small and in particular if these do not comply with known administrative units.

TT3 contains 1525 model zones. These are based on the NUTS-2007 zone structure, which has been modified in order to:

- Better accommodate the NUTS3 2010 zone system
- Provide a more uniform zone system with respect to population size
- Detail important zones in urban areas
- Make the number of zones computationally manageable

Network

The network data for TransTools3 was initially developed and updated in the ETISplus project and based on seven separate networks:

- Road, including road ferries
- Rail (passenger, freight), including passenger ferries and freight ferries, and passenger stations
- Air (passenger), and airports
- Inland waterways
- Maritime transport network, and harbours
- Multimodal terminals (freight) linking the various freight networks

Initially, requirements with respect to data coverage, attribute details and number of attributes were specified as input to ETISplus. Later, an ArcGIS server web interface was developed in order to allow for online checking, validation and correction of networks and network data by all TransTools3 partners according to their local experience. The zone system has been extended to cover the whole world, and the passenger air network has been extended to describe intercontinental passenger transport. In addition the project has created a maritime transport network connecting harbours in Europe, as well as describing intercontinental sea transport to major international harbours outside Europe.

All networks, the zone system and attribute data are IPR-free and will be publicly available once finally approved.

Data for demand models (freight and passenger)

The latest available European travel survey is the DATELINE survey from 2001. Aside from travel survey data whose usability is reduced after a few years, we should also note that the EU has grown since 2001. However, since DATELINE has the widest geographic coverage compared to other sources, it was decided to use it as the primary source for estimation..

Freight data for estimation is always very hard to find. However, the project got access to the disaggregate observations in the French ECHO and the Swedish CFS

data, that can thus be used to estimate the models choice functions. The two surveys are especially well-fitted for the purpose, since they are consistent with the NUTS classification and the classification of commodity groups. The calibrated trip matrices (from the network models) will be used as a supplementary data source in order to scale the models and fit destination choice models.

For further information on the TransTools3 data description, please visit http://transtools3.eu/deliverables.

D5.2 DATA DESCRIPTION DOCUMENT

The data work has been documented in deliverable D5.2 Data description document (available for download at www.transtools3.eu). This document provides a detailed data description for the TT3 model. The origin of the different data sources is described alongside an explanation of the thorough partner validation process that has been implemented in the TT3 process. The deliverable also presents all the model attributes.

The approach of the data description document is not to focus on data problems encountered during the project but rather to provide ways to circumvent all of these problems. Hence, the document adopts a solution-based approach to the generation of networks, matrices and counts.

TT3 GRANT AGREEMENT AMENDED

An amendment to the TT3 Grant Agreement became necessary to allow for the successful implementation of the project. The amendment involved:

- A 22-month extension of the project (01.03.2011 to 31.12.2015);
- A revised time schedule and production plan;
- A reallocation of the budget so that more resources were allocated to data-processing and validation, while the level of ambition of the TT3 modelling was reduced. The latter particularly concerns the railway network modelling, since no schedule-based network and only few counts were obtained from ETIS (due to difficulties getting this information IPR-free from the railway companies).

WORK PERFORMED SINCE PROJECT INITIATION

- Development of the overall model design as well as sub-model designs: A

set of model design notes laying the methodological foundation for model development was produced;
- Clarification of software needs within each sub-model and development of base software of sub-models;
- Design, testing and implementation of the model architecture and framework.
- Design of the simple and the detailed user interfaces which are ready for application by the sub-models.
- Clarification of data needs and identification, collection and preparation of data. This included commenting on format specifications and meta-data from ETISplus, ensuring access to and analysis of alternative data sources, e.g. the Swedish Commodity Flow Survey, the French ECHO surveys as well as other national data.
- Development, set up and application of a web-based facility to produce network editing across partners. European network validation and editing for all modes carried out by partners using this interface.
- Creation of a world zone system (zones outside Europe) in order to model intercontinental sea transport (freight) and air transport (passengers). Selection of international harbours and airports outside Europe to be included in the model.
- Construction of value-of-time estimates based on a META study by ITS Leeds, where VoT data were collected from national models and -surveys.

POTENTIAL IMPACTS AND USE OF RESULTS

Despite the above-mentioned project changes, **the general ambition, impact and use of the model remain largely unchanged –** except with regards to the rail model.

As a result, the project still works towards producing one overall and final result: an integrated model that will cater for more informed transport policies and decisions. All WPs, tasks and activities in the project are targeted towards this end-result.

The main impacts – when the model has come into use – are expected to be as follows:

- The project has validated transport data from ETISplus and collected data from other sources, compiling and merging them into a joint TT3 database that describes transport in Europe. All data will be available in an accessible format, whereby it can be of use – not only to DG MOVE – but

to member states, transport organisations, NGOs, etc.

- The model area will have been enlarged in order to model intercontinental sea transport (freight) and air transport (passengers)
- TT3 can be used for assessing the impacts of specific European transport policy measures, the energy and/or fiscal/economic policies with focus on the transport sector, as well as TEN-T and other infrastructure projects.

THE CONSORTIUM

Beneficiary name	Country
Technical University of Denmark	Denmark
Institute of Transport Studies, Leeds	United Kingdom
Royal Institute of Technology	Sweden
Rapidis	Denmark
Tetraplan	Denmark
University of Oxford	United Kingdom
National Technical University of Athens	Greece
John Bates Services	United Kingdom
Swedish National Road and Transport Research Institute	Sweden
Nouveau Espaces de Transport en Europe Application de Recherce	France
ETH Zürich	Switzerland
University of Belgrade	Republic of Serbia
FŐMTERV Zrt.	Hungary
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