

Publishable summary

This periodic report describes the period from September 2014 to December 2016 and hence the final period of activities in the TransTools3 project (TT3). Below we offer a summary of the activities in the period.

1.1 Summary description of project context and objectives

The objective of the TT3 project was to upgrade and further develop the current TRANSTOOLS model (TT2) to a new and improved European transport demand and network model (TT3).

The project improved the methodological basis of TRANSTOOLS, improved and validated its data foundation, dealt with known deficiencies of the existing model, made the software faster and more efficient, and focused on the user needs, model documentation and model validation. In addition, the model updated the current TRANSTOOLS model - from 2005 as base year - to 2010 as base year based upon ETISplus and other data including transport networks (all modes), traffic counts, transport matrices (passengers, vehicles/coaches, freight in volumes and monetary values), zonal data (including socioeconomic data). In addition, the geographical coverage of the model was enlarged.

The level of detail with regard to the rail, maritime and air transport modules was increased. This allows for better analysis of costs, capacity and externalities of transport. Finally, the impact assessment model was improved.

The TT3 project has delivered a validated, well-documented and user-friendly model that provides policy makers with a tool for assessing and developing better transport policies. The TT3 model is free, and more open than the previous model (but building on ArcGIS and Windows).

The TT3 project consortium consisted of 14 partners. For more information about the project, please consult the project web-site: <http://www.transtools3.eu/>.

1.2 Work performed since project initiation

Since initiation of the project, the TT3 consortium focused in parallel on the following main activities:

- Managing and coordinating consortium partners and activities towards the overall common objective of the project – to develop the TT3 model. This among others included conducting a number of consortium as well as bilateral partner meetings, and the request for and implementation of two amendments to the TT3 Grant Agreement (ECGA).

- The development of the overall model as well as sub-model designs;
- Building of a data foundation - including specification of data needs, clarification of data availability, data collection and preparation, and generation of alternative data solutions when needed;
- Application, acquisition and validation of national data, other non-ETISplus data as well as ETISplus data. This included among others the implementation of a systematic network validation procedure where all partners by means of a dedicated web-based network editing tool have edited the entire European network for all modes.
- Specification of the model architecture and configurations, and development and implementation of a flexible modelling framework – including base software development of sub-models;
- Validation of sub-models as well as – in the end of the project - the overall TT3 model.
- Scientific and technical documentation of the model, the development of a user guide and the handover of the model to the EU Commission.

The project was organised in 12 work packages (WPs) including project management and cross-cutting activities.

WP1: Consortium Management and WP2: Cross-cutting activities: The objective of WP1 and WP2 was to ensure an effective overall management and coordination of the TT3 project that catered for an efficient and successful implementation of the project.

The activities in the final period of the project focused mainly on coordinating a validation of national data, the finalisation of individual sub-models in order to be able to finalise the overall model framework and the final validation of the overall model.

In addition, due to the fact that the TT3 project had been delayed, an amendment of the TT3 Grant Agreement was requested and approved. The amendment involved an extension of the TT3 project with 12 months until 31.12.2016.

WP3: Architecture and configuration: The objective of WP3 was to design the changes necessary to the overall model structure of TT2 in order to ensure a modular and flexible model implementation.

During the final reporting period, the architecture was revisited and technical aspects were adapted to the process of developing the model.

WP4: Flexible modelling framework: WP4 dealt with the linking of all sub-models developed in the project into one complete modelling system, which makes it easy for users to create and run different configurations of the model framework.

In the reporting period, this objective was achieved, which among others involved the implementation of actual configuration and the user-interface as well as the implementation of post-processing steps for calculation of key figures and automatic creation of standard maps.

WP5: Data collection and validation: The objective of WP5 was to prepare data for TT3 and in particular to validate ETISplus data, and collect and prepare data from this project for estimation and calibration of TT3.

Data collection and validation continued in the final reporting period, as alternative data sources to ETISplus were needed. Hence, it was necessary to identify and develop new data collecting procedures and define validation processes.

There were several activities in the fourth reporting period, including network validation for all modes where the effort was distributed among partners according to geography and modes, validation of harbours, stations and intermodal terminal layers, establishment of world zones and intercontinental air- and sea networks, as well as validation of demand matrices. This work was finalised end 2014.

WP6: Scenario generator: The objective of WP6 was to support the development of “boundary data” to be used when using the model for forecasting. This included population data, work force data, GDP data, car ownership, etc.

The work regarding the scenario generator was finalised in this period. This work involved a description of the different scenario data applied in the model and how the different types of data are linked and processed prior to scenarios.

WP7: Freight models and logistics: The objective of WP7 was to develop a new freight model, based on 2010 data.

During the period the freight model system was finalised. This involved the estimation of a trade model for the prediction of P/C matrices and the estimation of a logistic model for the prediction of logistic chains and choice of mode. The models are further calibrated to pocket the book as far as this has been possible.

WP8: Passenger demand model: The objective of WP8 was to re-estimate the passenger demand model from TT2, update the base year of the model and take nonlinearities into account.

During the period the passenger models were finalised and further calibrated to the underlying matrices. The passenger models involved the final development of a short distance model and a long distance model. Both models have been validated according to elasticities and the reproduction of trip-length distributions.

WP9: Traffic assignment: The objective of WP9 was to improve the route choice and traffic assignment component of TRANSTOOLS.

The traffic assignment model was finalised during this period and, for road, calibrated to network traffic counts. The work involved finalising a road-network assignment, a rail assignment and an assignment for aviation.

WP10: Project assessment model: The objective of WP10 was to develop a project assessment model that is able to evaluate physical infrastructure as well as toll charging policies and combinations of these.

In the 4th period the work was finalised. The work involved a description of how external costs related to project assessment are calculated, and involved a description of how consumer surplus is calculated in the model framework.

WP11: Model validation: The objective of WP11 was to undertake proper validation of the overall model in order to rule out possible errors and to establish a common consensus on the outcome of the model.

Work on WP11 was initiated and finalised in the last period of the TT3 project. WP11 ensured that all models in TT3 are thoroughly revised and that there was a validation of the complete model framework and the user interface. The deliverable on the model validation was however delayed beyond the reporting period, but submitted 25/04/2017.

WP12: Deployment, user guide, and maintenance: The objectives of WP12 were to provide a robust mechanism for the end user to install and uninstall TT3 as well as a comprehensive User Guide for TT3. These objectives were partly achieved in the reporting period, partly after the reporting period.

1.3 Results achieved and expected results

The overall result achieved by the TT3 project was the development of a new validated, well documented and user friendly projecting model system for passenger and freight transport in Europe – the TT3 model. The model consists of three main blocks: The passenger transport models, the freight and logistics models (de Jong et al., 2015), and the network assignment models.

Figure 1.1 illustrates the overall structure of the TT3 model system and how the different sub-models are linked. The demand part of the model is divided into a passenger and a freight model. Each of these models provides demand in the form of matrices which are input to the assignment model and from which level of service (LoS) variables are calculated and used as new input in the next iteration. From this process, the final origin-destination matrix is obtained together with the final equilibrated LoS. These are then used in potential impact assessment modelling.

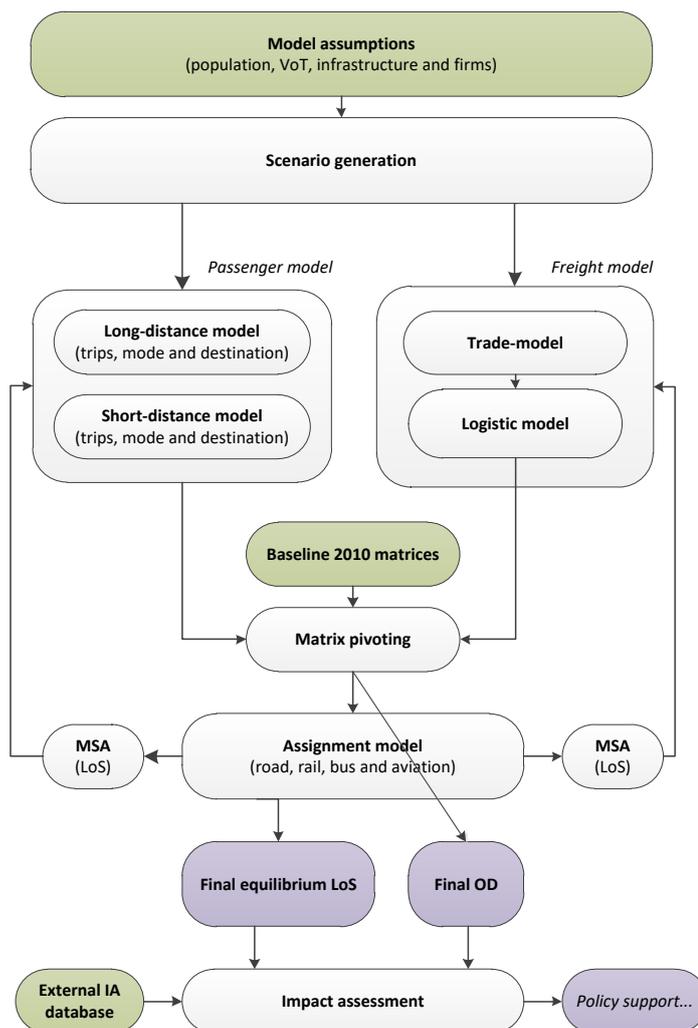


Figure 1.1: Structure of the TT3 model system

As such, the TT3 project has provided policy makers with a tool for assessing and developing better transport policies. The below table provides a summary description of the TT3 model:

Aspects	Details
Name of model (Acronym)	TRANSTOOLS 3 (TT3)
Organisation owning / operating model	European Commission, DG Move owns TRANSTOOLS, but makes it freely available, so many organisations operate it. EC Joint Research Center IPTS in Seville are “stewards” and intensive users of TRANSTOOLS.
Type of model & differentiating features	Detailed transport model covering passengers and freight in all Europe (to the Urals and the Black Sea and including Turkey).
Policy questions model can answer	Impacts of: infrastructure projects, transport policy, toll charging policies including substitution effects between modes (aviation, rail, and car) and treatment of different travel purposes. Impacts include: Consumer surplus, GDP, and transport flow enable precise prediction of

		environmental impacts at the most detailed network level.
Outputs		Detailed network flows.
Coverage & level of disaggregation	Sectors	Passengers by 4 trip purposes, Freight by 11 commodity types.
	Types of technologies	Petrol/Diesel vehicles treated separately.
	Countries / regions	NUTS-3 (1441 zones in total) and coverage of EU-42.
Experience	Key EC and other projects where model used	Very many. There does not exist a comprehensive list. A few of them are: TEN Connect, TEN Connect 2, WorldNET, ITren 2030, ETIS-Plus.
Any other key attributes		Passenger-modes: Air, Road, Rail, Bus Freight-modes: Road, Rail, Inland Waterways, Short-sea shipping

1.4 Potential impacts and use of results

The TT3 project worked towards producing one overall and final result: An integrated model that caters for more informed transport policies and decisions.

The general ambition, impact and use of the model are hence foreseen as follows:

- The project validated data on transport from ETISplus, and collected data from other sources, compiled and merged them into a joint TT3 database that describes transport in Europe. This provides a general knowledge on transport in Europe. All data are available in an accessible format, whereby it can be of use – not only to the European Commission – but to member states, transport organisations, NGOs, etc.
- TT3 can be used for assessing impacts of overall European Transport Policy, energy and/or toll charging policies with focus on the transport sector, as well as of TEN-T and other major infrastructure projects.
- Finally, TT3 can be used in context of national transport models – in cases/countries where no national model exist - as a base for developing national models, or in order to describe international traffic to/from and through countries, especially in countries with much international transport or in border regions.