



Transport Modelling:
Towards Operational
Standards in Europe
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Abstract:

The report describes the activities during the life time of the MOTOS project and also the results achieved.

Keywords:

MOTOS conference, dissemination, handbook, user needs



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Executive summary

Objective

The high level objective of the MOTOS project is:

To support transport policy in Europe, by defining common good practice principles for national and regional transport modelling that satisfy immediate needs of model developers in the new Member States and contribute to the establishment of a standardized approach for transport modelling in the European Union.

Main result: the MOTOS handbook

The process of integrating transport policies within the enlarged Union is a challenging issue for the new Member States in the coming years. Transport policy tools of the new Member States need to be developed and integrated within the European model tools, to ensure consistency and common understanding of strategic policy issues. Therefore, it is of crucial importance for developing common European transport models, to identify the immediate user needs and main bottlenecks on transport modelling in the new Member States. The new Member States have a particular interest to set up, enhance and/or link transport models at national and/or regional levels based on their needs. The MOTOS handbook tries to give guidelines how to develop and to build transport models to support an effective and successful transport policy. These guidelines are based on common best practice principles, mostly coming from the old member countries.

Before making this handbook we have put considerable effort into determining user needs from model developers and policy makers. This user needs analysis were reinforced by targeted workshops in the new member states. In continuation, the handbook identifies and describes best practices and common pitfalls in setting up, enhancing and linking national and regional transport models. Common best practice principles are defined for the most important processes identified in the user needs analysis. The handbook for transport modelling is also made available in an on-line navigable version.

This handbook contains three parts:

1. it provides a general description of the modelling process. Topics discussed include data collection, model estimation, uncertainties in models, linkage to other models and transport modelling software.
2. the handbook addresses modelling issues from the point of view of users, i.e. the policy-makers. The aim of is to describe for each issue the process followed by policy-makers who have identified a “problem” and need a model to resolve it. These issues are then linked to modelling processes (passenger demand



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- modelling, freight demand modelling, assignment models, economic models and/or impact models). A list of present models that can be used as a reference case is also presented, as well as a link to best practice examples.
3. an extensive description was made of the state-of-the-art of transport modelling and a number of best practice examples were collected and described.

This handbook can be used in two ways. Firstly, the hard copy of this handbook can be used for normal reading. For more information about a specific transport modelling subject, references to literature (in the list of references at the end of this handbook) and references to the report on state-of-the-art and best practice examples are given.

MOTOS Conference

The MOTOS conference (24th and 25th may 2007) was one of the key dissemination activities. This main conference was dedicated to the dissemination of the outcomes of the project and the MOTOS Handbook, which is the final product of MOTOS. It was important to get feedback about the Handbook from the users' point of view. Therefore, a broad range of transport related professionals were invited. Altogether some 50 participants were registered; 63% of the colleagues were from the new member states.



1 1. Introduction

This final activity report is devoted to the MOTOS project. It covers all the work performed, objectives, results and conclusions, including a final plan for using and disseminating the knowledge.

1.1 The MOTOS project

Transport modelling in the new Member States is a difficult job, for model developers are faced with poor data availability and a lack of adequate tools and instruments. As a consequence, policy makers can be concerned about the appropriateness of the impact assessment of socioeconomic and environmental indicators. Moreover, there is a lack of consistency in common transport modelling between bordering countries, i.e. at European regional level.

Therefore, it is of crucial importance for developing common European transport models, to identify the immediate user needs and main bottlenecks on transport modelling in the new Member States. The new Member States have a particular interest to set up, enhance and/or link transport models at national and/or regional levels based on their needs. We propose to base the transport models for the new Member States on common best practice principles. This approach brings advantages both in terms of costs and of performance. Efficiency and effectiveness can be achieved by applying proven methodologies for design, development, data use, practical use and maintenance of the models. Besides, best practices gives an example for linking models (bordering territories) and data aggregation (checking or feeding national models with data from regional models, or European models from national models).

The European best practices provides guidance and an incentive for new Member States to progressively move towards its application, as they find it appropriate. This should in turn facilitate the linking of bordering models and/or aggregation of models, thereby paving the way for a bottom-up path to establishing better-grounded transport models at the more aggregate (national or EU) level.

The MOTOS project aimed at the integration of transport modelling in the enlarged union. The high-level goal of MOTOS was:

To support transport policy in Europe, by defining common good practice principles for national and regional transport modelling that satisfy immediate needs of model developers in the New Member States and contribute to the establishment of a standardised approach for transport modelling in the European Union.



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The project emphasises the importance of user needs and best practice as influential factors in the process of improving the general standards in modelling.

1.2 Project Objectives

To be able to reach this high level objective the following project objectives were defined:

- **Identify the user needs** in the setting up, enhancing or linking of national and regional transport models, from policy makers and model developers in the 10 new Member States and EU15 (WP1)
 - Identify the most important practitioners in the 10 new Member States and build up a first version of the contact database for project dissemination with more the 200 practitioners from different users groups.
 - Provide overview of user needs in EU15.
 - Provide overview on the status of transport modelling in the 10 new Member States.
 - Organise 5 workshops in different Member States, with a least 50 participants from 8 central and eastern European Member States, to discuss the main bottlenecks and user needs.
 - Provide an overview of major obstacles (e.g. competence) in developing and applying transport models with a special focus on the 10 new Member States.
 - Direct approach, through questionnaires for national level users in Cyprus and Malta.
 - Establish a Steering Group of Users with at least 5 members from different Member States. The Steering Group will provide advice to the project partners and feedback on the draft versions of the project deliverables.
- **Identify and describe best practices** and common pitfalls in setting up, enhancing and linking national and regional transport models (WP2).
 - Describe model characteristics best practices for different types of transport modelling (freight modelling, passenger modelling, economic modelling and assignment techniques
 - Describe the methods and practicalities in linking models and in aggregating regional models to national models and national models to a European level model.
- Define **common best practices principles** for the most relevant processes identified in the user needs assessment (WP2).



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- **Produce a handbook** for setting up, enhancing and linking regional and national transport models and solutions for related data problems (WP3).
 - Describe the process of how to develop a national/regional model (which type of expertise is needed and what is the institutional embedding)
 - Provide technical and policy recommendations on aggregation of transport data and transport models
 - Produce a navigable version (on line and on CD-rom) of the handbook, so users can concentrate on the themes of their interest.
- Widely **disseminate the products** of project by involving around 150 users in MOTOS meetings in the new Member States, provide regular newsletters to over 500 users in EU25 and establish a project website that will have at least 1000 hits per month by the end of the project. (WP4).
 - Establish a project website that contains the project outputs in downloadable format and provides links to other information sources for national and regional transport modelling
 - To build a MOTOS contact database with at least 500 users from all Member States.
 - To produce a project brochure (2000 copies), at least 5 newsletters and a MOTOS CD-Rom (200 copies) that contains all deliverables and other reports.
 - An international conference in Hungary, with at least 100 participants each, to present the outcomes of the MOTOS project.
 - Present the MOTOS project at transport conferences throughout Europe and submit papers to academic journals.

Provide effective **project coordination**: Report to the Commission, ensure progress, timing and co-operation among the work packages, implement quality, risk management, exploitation plan and knowledge management procedures and liaise to other European research projects like TRANS-TOOLS and TRANSFORUM (WP5)

1.3 This report

This report summarizes the main activities performed and results achieved during the lifetime of the project. Chapter *two* starts with an overview of the activities and deliverables. Chapter three gives an overview of the costs and the allocation to the different partners.



2 Activity report

2.1 Work package 1 User needs and current state of affairs

Activities performed:

- Identifying the user needs in the setting up, enhancing or linking of national and regional transport models, from policy makers and model developers in the 10 NMS and EU15 (WP1):
- Practitioners in the 10 NMS are identified and a contact database was built up for project dissemination with practitioners from different users groups. In total 1.100 persons are listed;
- An overview is given of the user needs in EU15;
- An overview is given on the status of transport modelling in the 10 NMS;
- A survey was held to prepare the workshops
- 4 workshops were organised in Prague (Czech and Slovak Republic cases), Budapest (Hungary case), Vilnius (Baltic States case) and Warsaw (Polish case).
- questionnaires for national level users in Cyprus and Malta;
- a Steering Group of Users was established with 5 members from different NMS, namely Mr. Arenijus JACKUS from Ministry of Transport, Lithuania, Mr. Martin Pichl Ministry of Transport, Czech Republic, Mr. Zsolt Denke Budapest Transport Association, Mrs. Grażyna Sikorska-Czapnik Department of Programming and Strategy, Poland and Mr. Ivan-Carl Saliba Ministry for Urban Development and Roads
- The deliverable D1.1 “Transport modelling user needs in the New Member States” was produced. Publishing date January 7th 2007

Key findings

The key findings of transport modelling investigated within WP1 in New Member States can be summarised as follows:

1. The models used in NMS are ranging from macro-models (state and region level) through mezzo-models (agglomerations, towns, communities) to micro-models (town parts, crossroads). But, in general, there is focus on regional modelling, not for national. However there are national interests in transport modelling, especially in the Baltic States and modelling of the TEN-T development.
2. Transport modelling as the professional tool for decision-making process is important and the participants of the workshops agreed that it should be promoted in many ways. It was indicated, that transport modelling becomes a higher importance where the public is involved, which forces the policy makers to make well-founded decisions and arguments.
3. Uni-modal is the most common application of the transport modelling, but also multimodal models exist, at regional level (mainly regions and



agglomerations). In all NMS are used the following multimodal models: private transport (cars) and public transport models (covering all modes of transport) with modal split; traffic models for forecasting modal flows (rail and road); network traffic models to assign traffic flows (road and rail) to the network elements. There are used the specific multimodal models in Poland, e.g.: demand models for forecasting rail and road transports (freight and passenger) for selected regions and the model covering intermodal and road freight transports modelling between Poland and Germany (on selected routes and for selected goods). The examples of multimodal models used in the Baltic States: modelling multimodal networks for long-term transport planning (land traffic connections to seaport Tallin), forecasting transport flows within national transport strategy (Lithuania) and travel demand models for public transport (Latvia). Detailed information is presented in the Annex II to the Report.

4. Transport models applications:

- The models in passenger transport, both car and public transport, are more often developed and use in practice, than freight models, followed by the user needs, expressed especially at regional and local level. The main focus is on modelling passenger transport demands and forecast of passenger traffic flows.
- As far as freight transport modelling is concerned, there are some differences between countries, namely: in Poland and in the Baltic States freight modelling is used for international corridors and distribution centres; in Hungary freight models are used quite rare; in Czech and Slovak Republics freight transport models are not used at national level. But Czech and Slovak Republics are very interested in freight transport modelling, especially forecasting freight traffic flows by modes of transport.
- Although all kinds of transport models were assessed as useful, passenger transport models are regarded as more useful as freight transport models.
- All countries, except for Malta & Cyprus pay a lot of attention to the economic impacts of transport.

5. Types of models used in NMS:

- In general, there are two groups of models used in New Member States: Models with use professional software packages and so called “own models” developed by the experts for specific user needs, that are based on knowledge on economical, statistical and econometric methods of programming.
- The following transport models are mostly used in NMS: forecast transport demand; direct network models to assign traffic flows to the network; impact models on transport infrastructure and policy interventions (using cost-benefit or multi-criterial analysis); socio-



economic impact models; road network models; models on traffic distribution in urban network; financial models.

- Model developers: typically, professional consultants, from consulting private companies, universities and research institutes develop and operate the transport models in each NMS.
6. Users of transport models in NMS are mostly the regional and local authorities. However, governmental bodies such as Ministry of Transport, Ministry of Economic Affairs and Communications, Road Administrations are also the users in Hungary and in the Baltic States.
 7. The following user needs, in terms of conditions and expectations on transport modelling, have been identified: effective analysis of results; reliable software applications; ability of applying applications in real time; ability of modelling trips by origin/destination matrices; reliable and effective tools for public transport modelling; complex modelling transport demand; advanced tools for assigning traffic flows to transport network; easy to use and not requiring too complicated training for personnel.
 8. The main bottlenecks on transport modelling in NMS are as follows:
 - The lack of reliable, adequate and up-to-date information and data essential to use models in practice is the main barrier and bottleneck in transport modelling. Additionally, there is low availability of high-quality data as well as non-uniform structure of initial data. Gathering of solid forecasts of socio- economic data is another quite important barrier.
 - Lack of qualified personnel is also regarded in all countries as main barrier and bottleneck in using and developing transport models.
 - Lack of applicable professional software/programmes and lack of resources for purchasing the software.
 - Lack of standard types of transport models what causes sometimes lack of interest in transport modelling.

2.2 WP 2 State-of-the-art and best practice examples

Activities

- Description of the policy issues and user needs that the models should support based on results of WP1 and, how they differ between EU, EU15, and New Member States (NMS).
- General introduction to different aspects of transport modelling and data issues.
- Overview of general aspects of transport modelling.
- Introduction to the basic tools of transport modelling. It introduces the important concepts: demand, supply, and equilibrium. Furthermore, it introduces estimation, calibration, and validation procedures, and emphasises the need for proper validation in transport modelling.



- Overview of the central relationship between model and data. On one hand, data needs depend of course on the nature of the model. On the other hand, design of the model must reflect available data sources. Therefore, the base of a model is the quality and amount of available data, and strictly speaking, no model is better than the data it is founded on.
- Introduction into freight modelling, and the increasing importance that elements like logistics are integrated into a freight model.
- An overview of passenger demand modelling. The discussion ranges from the classic four-step models to advanced activity-based models.
- Description of the linkage between economic activity and the derived transport demand.
- Different frameworks often used for traffic assignment modelling are presented
- Introduction of the economic assessment procedures including a discussion of Cost Benefit Analysis (CBA) and Multi-criteria Analysis (MCA).
- Also discussed is ways to model external effects resulting from transport. Included is a discussion concerning models for traffic accidents, traffic noise, road wear, emissions, and barrier effects.
- Finally attention is given to linking of different scales. We focus on the way different sub-models and model levels can work together through linking. The two main examples are the national model of Sweden and the EU-level model TRANS-TOOLS.
- An extensive overview of different best practice examples is given. They have been chosen to cover most of Europe and the different subjects: freight, passenger, economic, and assignment modelling.

Key findings

Two reports are produced, namely:

- D2.1 MOTOS State-of-the-art report, publication date 30th of March 2007 and
- D2.2 MOTOS Best practice examples, publication date 30th of March 2007

2.3 WP 3 Handbook and recommendations

Activities

- An update was made of the MDir. The MDir (modelling directory) gives an overview of a great number of existing transport models in Europe (>300 descriptions).
- Draft structure of the handbook. Discusses at the Warsaw project meeting. Aspects as institutional aspects, stakeholder analysis, data collection, were added to items dealt with in the handbook.



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- Policy issues and the models "fit for purpose" (to speak in TRANSFORUM terms) are dealt with. These general policy issues are:
 - Strategic mobility
 - Demand analysis
 - Land use planning
 - Industrial location decisions
 - Ex-ante policy analysis
 - Investment analysis
 - Modal shift
 - Infrastructure planning
 - Pricing
 - Road traffic management
 - Urban public transport planning
 - Rail transport planning
 - Intermodal solutions
 - Project impact assessment
 - Environment and safety
 - Capacity utilization

- finally all the information was put together in one handbook, resulting in a document of more than 400 pages. Added to this document are all kind of hyperlinks to make it for the user much easier to find the information he is looking for. This handbook is made available to the public on the MOTOS website

Key Findings

D3.1 Handbook containing guidelines of constructing national and regional transport models “Handbook of transport modelling (in Europe): learning from best practice”, publication date June 7th 2007

D3.2 Website routing for handbook, publication date June 7th

2.4 WP 4 Dissemination

Activities

- Right at the start of the project a website was developed and a domain name (<http://www.motosproject.eu>) opened. During the lifetime of the project the progress of the project could be followed based on regular up-dates of the website.



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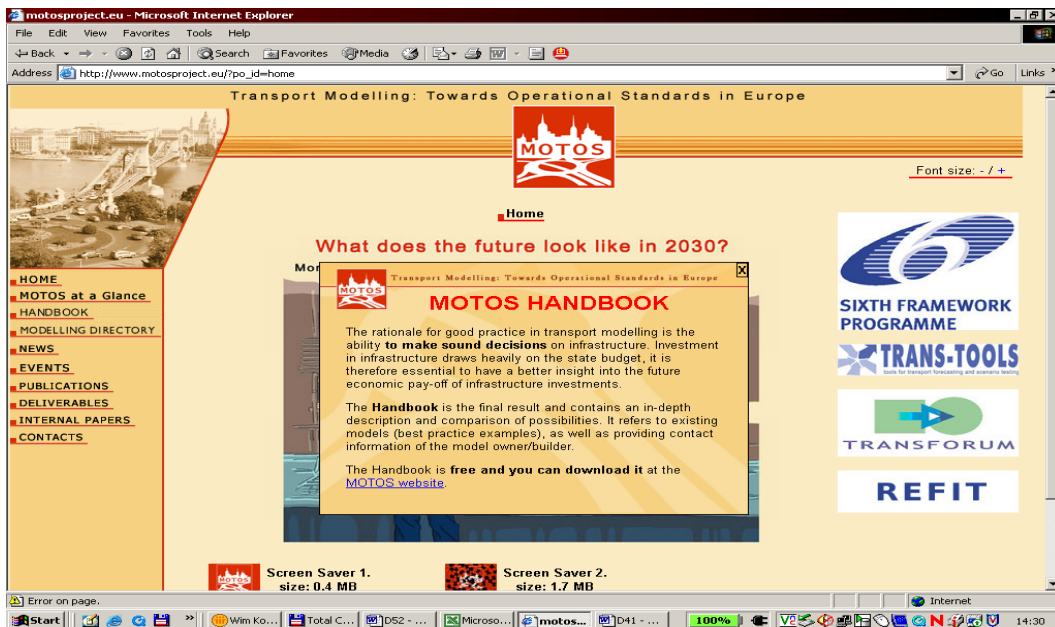


Figure 2.1: Homepage of the MOTOS website

- A MOTOS contact database was set up. It contains the contact details of all identified users of the project results in the EU25. This in total appr. 1.100 persons.
- At the start of the project a brochure was made detailing the objectives and structures of the project. About 2000 copies were produced and distributed to the related individuals.
- A two sided newsletter was produced five times. The newsletters were distributed electronically to the users from the contact database. At MOTOS workshops and meetings also paper copies will be made available.
- All partners presented the project at conferences, workshops and other national or European events. Newsletters, brochures, CD Roms and other materials were distributed.
- A presentations was given at the TRANSFORUM, November Amsterdam
- At may 24 and 25 the MOTOS conference was organised in Budapest. At these conferences the MOTOS products were presented by all MOTOS partners. The conference had appr 50 participants. Also all participants received in advance a draft version of the handbook.
- After the conference the following activities were performed:
 - o Adding hyperlinks for quick searching
 - o Introduction in different languages (on the website)
 - o Updating based on remarks made, such as:
 - Specific use and content of some freight transport models
 - Textual suggestions and
 - o Recommendations for the EU are included in the final handbook



A specific deliverable was dedicated on the developed and structure of the website:
Deliverable D4.1 MOTOS Website (Publication date 28th July 2006).
The second deliverable was D4.2 MOTOS Conference, published on 11th June 2007.

Key Findings

If we summarize the hits of the different pages of the site for the total timescale of the project (see the following subpage counter table) it gives 12.948 hits and divided by 12 (months) it means 1.079 monthly hits. Therefore, the MOTOS objective to reach the minimum 1.000 monthly hits was successful.

In total more almost 1.100 people are included in the contact data base. All of these people were send the digital version of final handbook.

Month	Status	Count
2006.July	subscribed	598
2006.August	subscribed	99
2006.September	subscribed	7
2006.September	unsubscribed	11
2006.October	subscribed	30
2006.November	subscribed	1
2007.February	subscribed	340
2007.February	unsubscribed	2
2007.March	subscribed	1
2007.June	subscribed	1

Table 3.1: Registration of the contact database

To every person of the contact database five news letters were send, namely:

July 2006 : First News letter
October 2006 : 2nd news letter
February 2007 : 3rd news letter
March 2007 : 4nd news letter
June 2007 : 5nd news letter

On the website all news letters can be found.

The MOTOS conference was one of the key dissemination activities. The conference tried to capture participants from as many new member states as possible.

Altogether some 50 participants were registered mainly via the website and some colleagues just registered at the conference reception desk. 63% of the colleagues were from the new member states. The final list of participants can be found on the website.



The members of the conference came up with following recommendations:

About the Handbook itself:

- Organisation around models and data important
- Harmonisation, Maintenance, Quality control
- Central institute per country which collects all transport models and feels itself responsible for the quality (e.g. DK, Sweden)
- Multilingual introduction
- Summaries of every section in two or three slides

About the dissemination:

- Pay explicit attention towards dissemination of the results
- Be specific on the target groups

Options for the EU

In this sense, the participants raised a broad discussion, which part/institute of the EU should be addressed and who is the EU (DG TREN, DG Research, EIB, etc).

The following comments/suggestions were collected:

- Raise awareness for importance of good transport modelling:
 - o Keep on promoting initiatives like MOTOS
 - o Specific fund is needed for translating whole handbook into Hungarian, Polish, Bulgarian, etc.
- Regulation for data (legal framework):
 - o Minimum requirements
 - o Public access
- Knowledge management:
 - o Keep the website of MOTOS alive for more than one year
 - o Knowledge Education courses: real hand on experience with transport modelling
 - o Obligation to use existing guides/results like SPOTLIGHT
 - o Subsidizing Annual Transport Modelling conference
- National centre for (regional) transport modelling in every country
 - o Coordination between these centres
 - o Education
 - o Standard methods for data collection
- EU Support for further development for TRANSTOOLS
- Stimulate/enforce international cooperation on corridors

Finalizing MOTOS

Regarding the final version of the Handbook the following tasks remained:

- Introduction in different languages
- Updating based on remarks made



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- Adding hyperlinks for quick searching

2.5 WP5 Project management

Activities

- The technical co-ordination of the MOTOS project was performed in a relatively short time period. Timing and close co-operation between the work packages is of the utmost importance.
- Three project meetings were being held:
 - A kick off in the Hague
 - Progress meeting in Warsaw
 - Progress meeting in Copenhagen
- A project Steering Committee was formed with high level representatives of all partners. The objective of this group was to decide on contractual and legal issues concerning the project. This group would meet only in case of conflicts and on request of one of the partners. During the lifetime of the project there was no need for the project Steering Committee to come together.

Key findings:

Two deliverables were produced:

D5.1 “Periodic reporting”, first version published on 11th December 2007 and
D5.2 “Exploitation Plan” first version published on 11th November 2007.



3 Deliverable list

Del. no.	Deliverable name	WP no.	Lead participant	Publication date
D1.1	Transport modelling user needs	1	OBET P.P.	07-01-2007
D2.1	State-of-the-art and best practice examples	2	DTU	30-03-2007
D2.2	Common best practice principles	2	DTU	30-03-2007
D3.1	Handbook on transport modelling	3	TNO	07-06-2007
D3.2	Website routing for handbook	3	Goudappel	07-06-2007
D4.1	MOTOS Website	4	TRANSMAN	01-08-2006
D4.2	MOTOS conference	4	TRANSMAN	11-06-2007
D5.1	Periodic reporting	5	Goudappel.	11-12-2007
D5.2	Exploitation Plan	5	Goudappel	11-11-2007



4 Main Result: the handbook

The process of integrating transport policies within the enlarged Union is a challenging issue for the new Member States in the coming years. Transport policy tools of the new Member States need to be developed and integrated within the European model tools, to ensure consistency and common understanding of strategic policy issues. Therefore, it is of crucial importance for developing common European transport models, to identify the immediate user needs and main bottlenecks on transport modelling in the new Member States. The new Member States have a particular interest to set up, enhance and/or link transport models at national and/or regional levels based on their needs. The MOTOS handbook gives guidelines how to develop and to build transport models to support an effective and successful transport policy. These guidelines are based on common best practice principles, mostly coming from the old member countries.

Before making this handbook considerable effort was put into determining the user needs from a model developer point of view and from a policy maker point of view. This user needs analysis were reinforced by targeted workshops in the new member states. In continuation, the handbook identifies and describes best practices and common pitfalls in setting up, enhancing and linking national and regional transport models. Common best practice principles are defined for the most important processes identified in the user needs analysis. The handbook for transport modelling is also made available in an on-line navigable version. This handbook is the final product of the MOTOS project.

This handbook contains three parts:

1. it provides a general description of the modelling process. Topics discussed include data collection, model estimation, uncertainties in models, linkage to other models and transport modelling software.
2. the handbook addresses modelling issues from the point of view of users, i.e. the policy-makers. The aim of is to describe for each issue the process followed by policy-makers who have identified a “problem” and need a model to resolve it. These issues are then linked to modelling processes (passenger demand modelling, freight demand modelling, assignment models, economic models and/or impact models). A list of present models that can be used as a reference case is also presented, as well as a link to best practice examples.
3. an extensive description was made of the state-of-the-art of transport modelling and a number of best practice examples were collected and described.

This handbook can be used in two ways. Firstly, the hard copy of this handbook can be used for normal reading. And secondly, for more information about a specific transport modelling subject, references to literature (in the list of references at the end of this handbook) and references to the report on state-of-the-art and best practice examples are given.