D7-GTF Workshop Report

Report on the GTF Workshop held on 11th-12th October 2001 in Barcelona

Deliverable D7

Project: SPOTLIGHTS-TN (Thematic Network)

Contract No 1999-TN.10941

Project Co–ordinator

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WP Leader

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Other Partners

DTU, Technical University of Denmark (Copenhagen, Denmark)

Date: 5th February 2002

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COMMISSION UNDER THE TRANSPORT
RTD PROGRAMME OF THE
5th FRAMEWORK PROGRAMME

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1. EXECUTIVE SUMMARY

The “Generalised Transportation-data Format” (GTF) workshop reached four results.

Firstly, the GTF Conceptual Model (GTF-CM) Specification in the version v0.6 r4 was accepted and validated. The main critical opinions were about

- Promoting the demand and / or flow generating classes to toplevel classes, in order to have already on this level support for demand oriented transport models
- To make clear in the description of the Zone class, that Zones on the same logical level in the GTF Conceptual Model must be disjunct and that Zones can be coverages of areas as well as points
- To make clear how to use the GTF-CM for aspects of dynamic modelling. This is covered by the current specification since all class instances (objects) can have Date objects attached as time-stamps

Secondly, the GTF-CM is but a first step in the proper direction. But in the next step, the design and implementation phase, close attention must be on “Components & Interfaces”. The GTF-CM is a description of a static structure of how information (and therefore data) in the problem domain of transportation modelling relate. Components & Interfaces is a programming paradigm focussing on dynamic aspects of the usage of the static GTF-CM. For example, the focus will have to shift from “How are the information related?” to “What information and operations do I need to compute a result?”, e.g. a shortest path.

Thirdly, the participants agreed that a list of recommendations to the European Commission, about the necessary next steps regarding the GTF effort, needs to be drafted and sent to the project officer. It should be attempted to get the EC, its institutions and the member states to endorse the GTF vision and the effort.

Fourthly, it was strongly stated by all participants that the GTF effort is a “matter of urgency” not only to improve the work of the transport modelling research field but also (and especially) to improve the work processes of decision makers and analysts in this field.

2. PROCEEDINGS

This section shows in detail the proceedings at the GTF workshop. Emphasis is laid on detail, e.g. all presentations are included (the submitted papers can be found in the annexes). This also holds for the minutes of the workshop which can be used to reconstruct the discussions and understand the decisions taken.

Agenda

spotlights

Third Workshop

"GTF: Next step to adopt an standard transport data model"

<u>Dates:</u>

11-12 October 2001

<u>Place:</u>

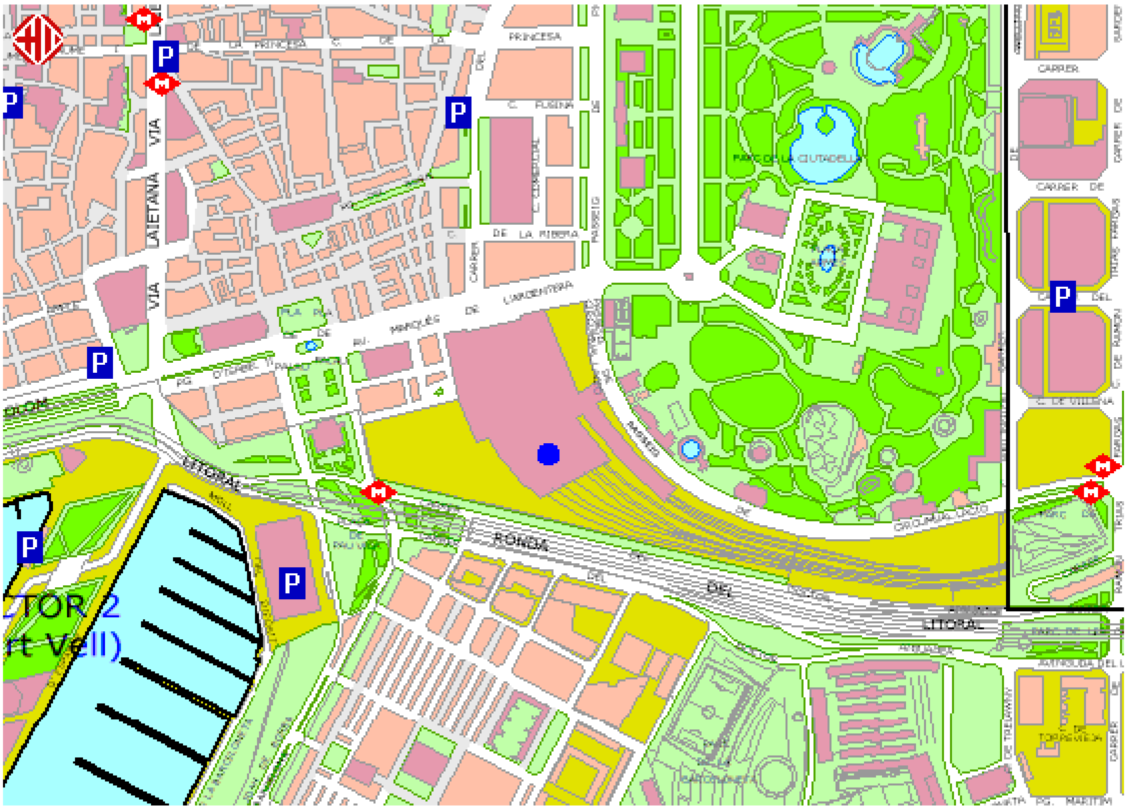
Institute of Territorial Studies

(Catalonia Government / Universitat Pompeu Fabra)

Barcelona

The venue is indicated with the number (3).

Signals will bee posted to indicate the room.



Campus de la Universitat Pompeu Fabra

Passeig de Circumval·lació, 8

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Telèfon: +34 93 542 26 33

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Click here to visit interactive mapping service of Barcelona:

Plànol de Barcelona

Reference hotel:

Hotel Covadonga, Avda Diagonal 596,

08021 Barcelona

Tel 34 93 209 55 11

Objective

The workshop (3rd spotlightsTN workshop) is focused on discussing the interest and feasibility of adopting a standard transport data model to *make advanced transport models more compatible*, with the aim of integrating advanced forecast models together with other software tools (database managers, GIS..) into policy-support systems.

The first objective is the *discussion of the need for defining a new data model and format -Generalised Transportation-data Format* (GTF), to become an standard for transport database exchange; the adoption of such a standard, up to now actually missing, will facilitate the easy transfer of databases between transport models, and database and GIS managers. This a necessary first step *towards the efficient integration of advanced models into policy-support systems*. Relevant experiences from innovative policy-support systems are going to be presented.

The second complementary objective is *the in-depth discussion of the already existing draft proposal for the GTF specification*, and its relation with closely-related data models (e.g. UNETRANS, GDF, etc.), and standard languages and meta-languages (XML, RDF).

Experts from many European countries will be invited to actively participate in the workshop, which is financed under the 5th European Framework Programme (spotlightsTN). A virtual Forum ("http://gtf.mkm.de" – subscription is required) is alive at the web of the project www.mcrit.com/spotlights as well as a Mailinglist for discussion about GTF (subscription: spotlights@mkm.de) hosted and maintained by MKmetric, responsible for leading the GTF research initiative.

Participants:

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10th October (internal preparatory meeting
for spotlightsTN Consortium and Scientific Committee Members)

at Mcrit
Salvador Espriu 93
08005 Barcelona

15:00 h – 19:00 h

WORKSHOP

11th October

9:00 BREAKFAST (Coffee, Tea and Croissants) served for all participants.

Introduction

10:00 Welcome: Dr. Serra, IET (5 min)

10:10 Objective of the workshop GTF/LTV: Dr Ulied (5 min)
10:15 Introduction to GTF: Dr Mandel (20 min)
10:35 EU's aim with GTF concerning ETIS: Mrs Panagopoulou (10 min)

10:50 Coffee break

First session: "Interest and feasibility of Transport Policy Support Systems"
Chaired by Dr. Gaudry

11:05 Transport Policy Support Systems in The Netherlands : Mr van der Loop (15 min)
Discussion
11:20 IGIS/EIB Actual and future developments: Mr Turró / D. Ferrer (15 minutes)
Discussion
11:40 GIS-PTOP: Spatial Policy Support System: Mr Baulies (15 min)
Discussion

12:00 BREAK

Second Session: "Transport Data Models: Towards a standard data model"
Chaired by Dr. Ulied

12:15 Transport data/conceptual models: Prof O. A. Nielsen (30 min)
Discussion
13:20 PLATOS-experience in The Netherlands: Mr Taale (25 min)
Discussion
12:50 GTF specification in examples and main topics: Mr Ruffert (20 min)
Discussion

14:00 joint LUNCH served at the same IET

Third Session: "Problems and Opportunities implementing GTF"
Chaired by Prof Nielsen

15:30 ATMax, management and strategic data models: ATMax: Mrs. Fábregas ATM / Mr Esquius (25 min)

Discussion

16:00 TRIPS, GIS and forecast models: Mr Logie (25 min)

Discussion

16:30 MEPLAN: Mr Williams (25 min)

Discussion

17:00 Coffee BREAK

Fourth Session: ”Common Understanding” on standard transport data models

Chaired by Dr. Mandel

17:15 Presentation ”Common Understanding” principles: Dr Mandel (15 min)

17:30 ROUND TABLE

- discussion
- working out of "Common understanding"

signing of "Common understanding"

20:00 DINNER (At a restaurant to be announced)

12th October

Fifth session: ”GTF in prospective”

Chaired by Prof. Nielsen

9:00 GTF on a Long-term prospective: Ontologies and Semantic webs: Mr Cañas (30 min)

Discussion

9:40 GTF-TIP Specification in depth. Towards a GTF ontology.: Mr Ruffert (30-45 min)

Discussion

11:00 Coffee BREAK

Sixth session: ”Summary of workshop”

Chaired by Prof Gaudry

11:30 h Summary of workshop: Prof Gaudry (10 min)

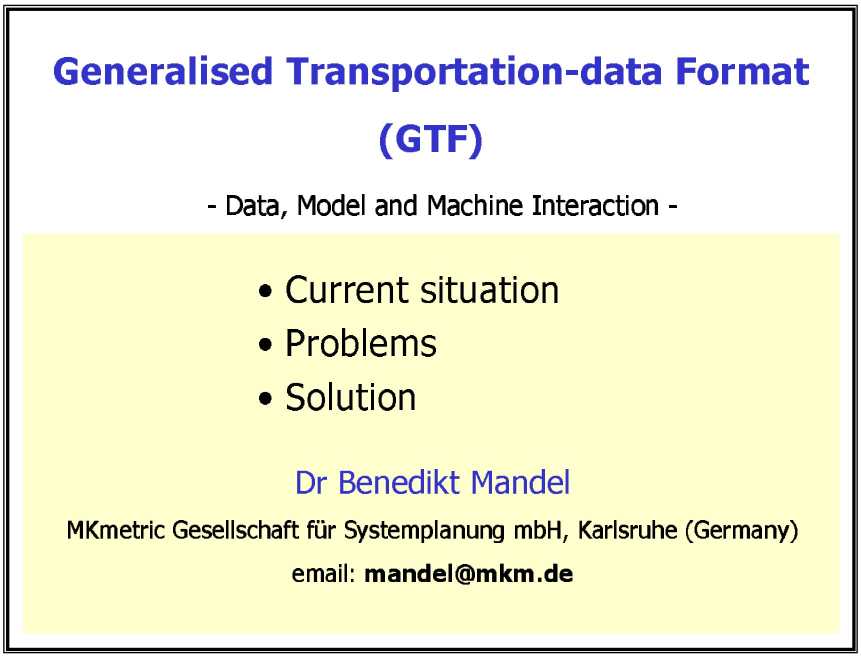
11:45 h Closing general remarks by the workshop participants

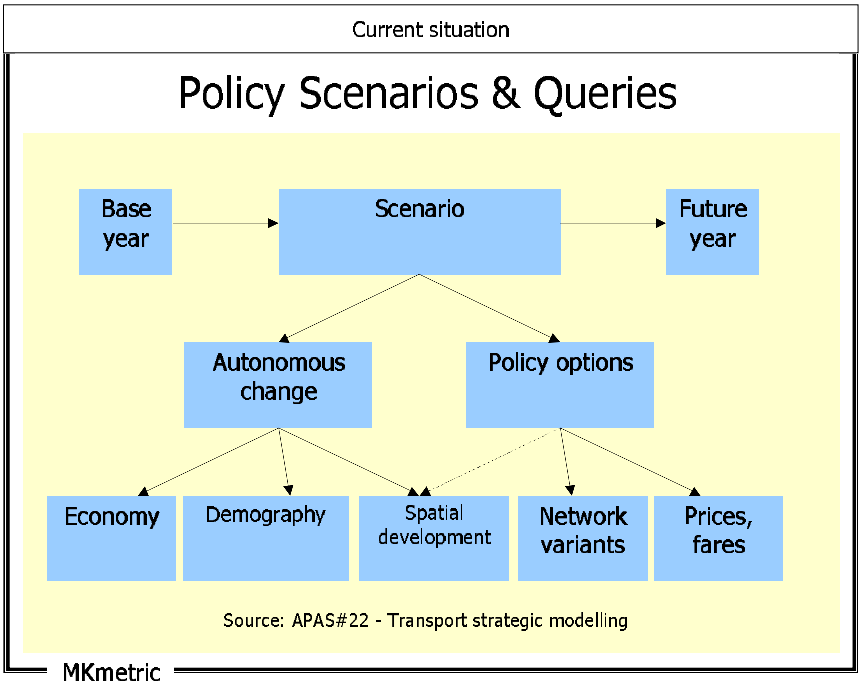
12:30 h Plans for next spotlightsTN activities: A. Ulied

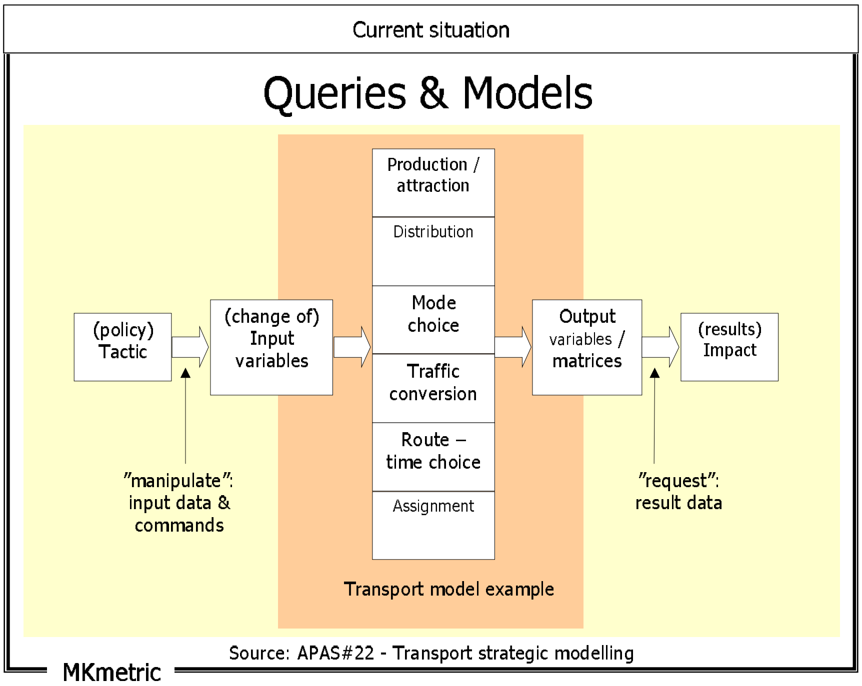
LUNCH (joint for those not flying) at the same IET

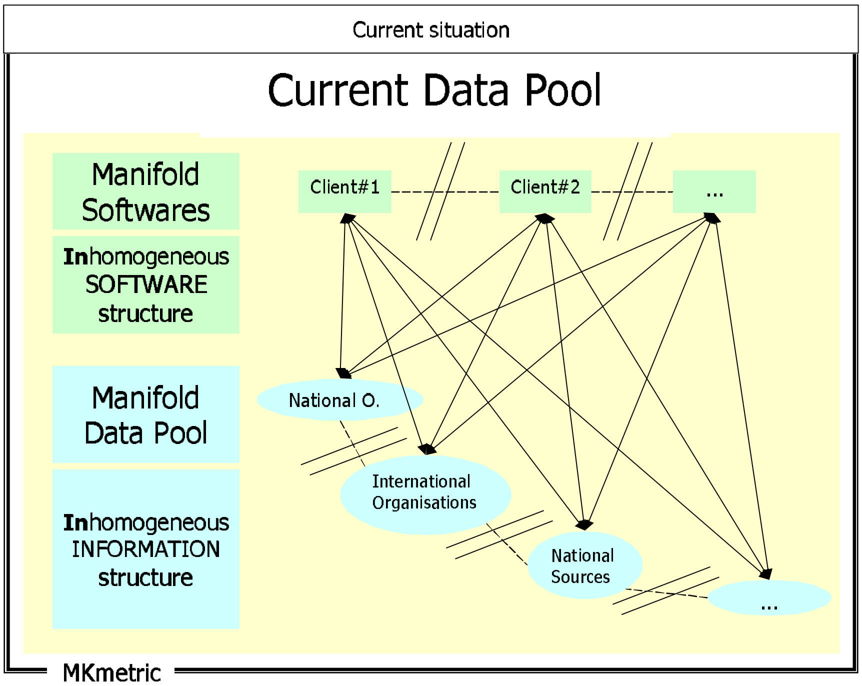
END OF THE WORKSHOP

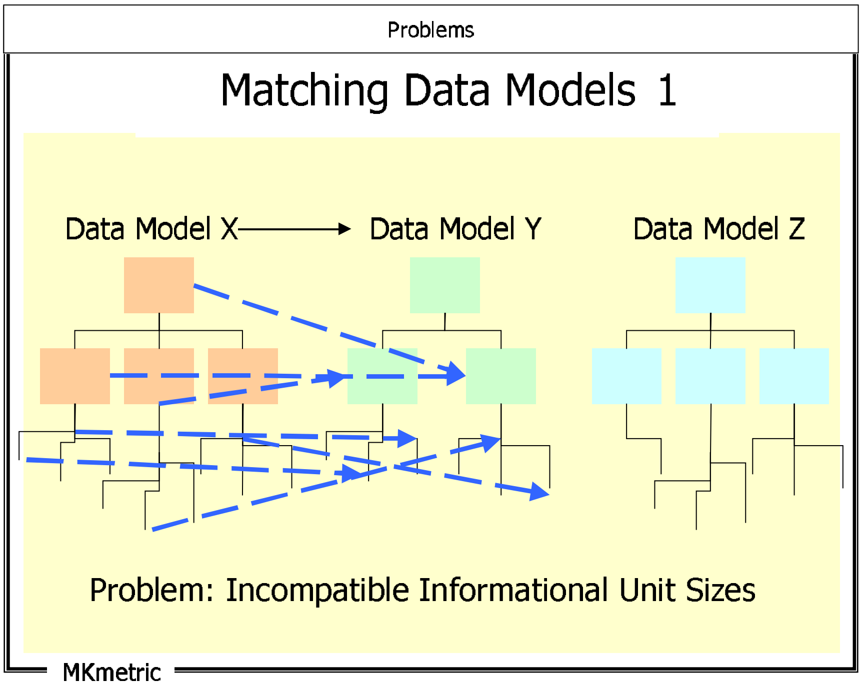
2.1. MKmetric (Dr Mandel): Generalised Transportation-data Format (GTF): - Data, Model and Machine Interaction –

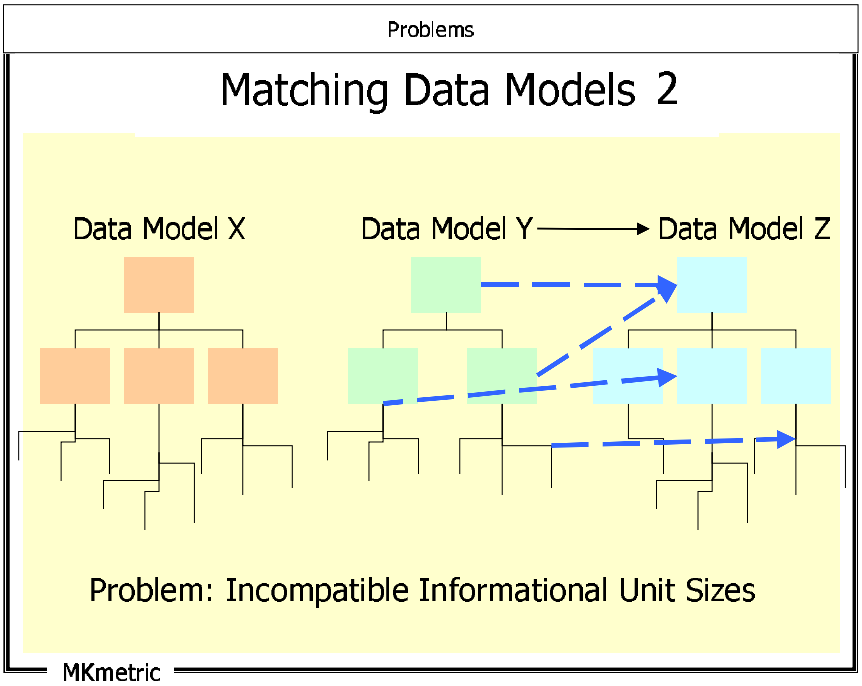


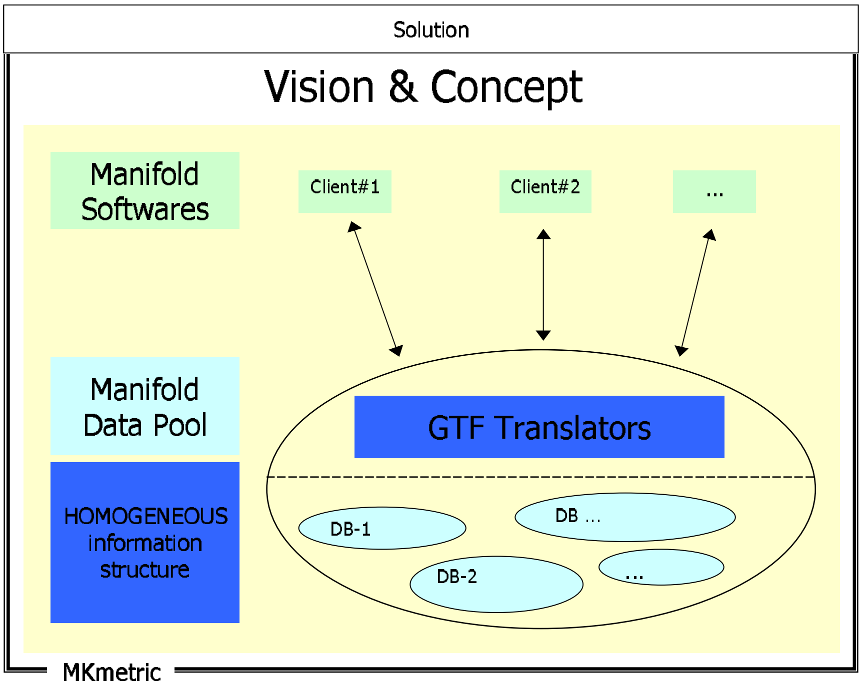


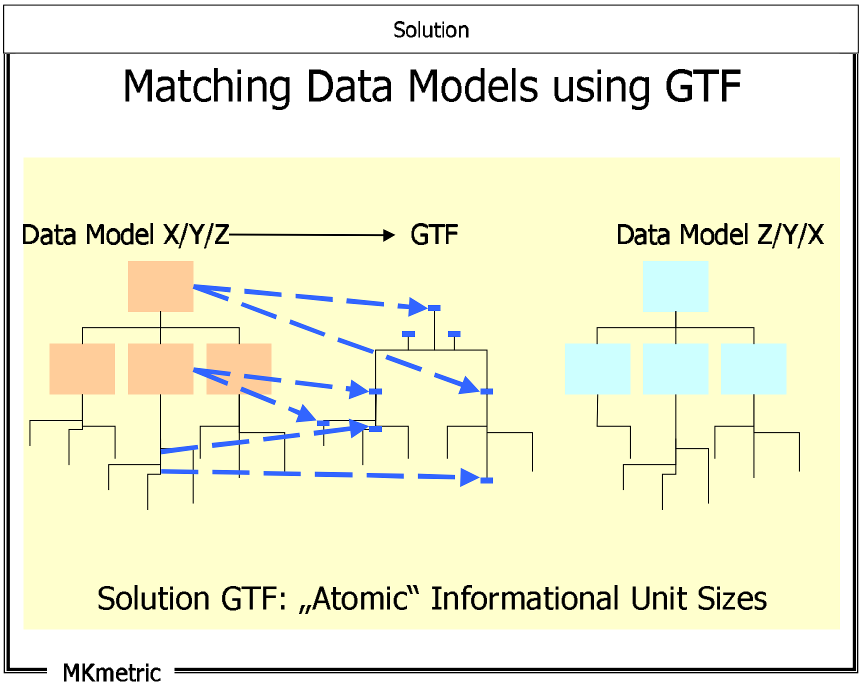

Current situation
Queries & Models
Production / attraction
Distribution
Mode choice
Traffic conversion
Route – time choice
Assignment
(policy) Tactic
(change of) Input variables
Output variables / matrices
(results) Impact
"manipulate": input data & commands
"request": result data
Transport model example
Source: APAS#22 - Transport strategic modelling
MKmetric

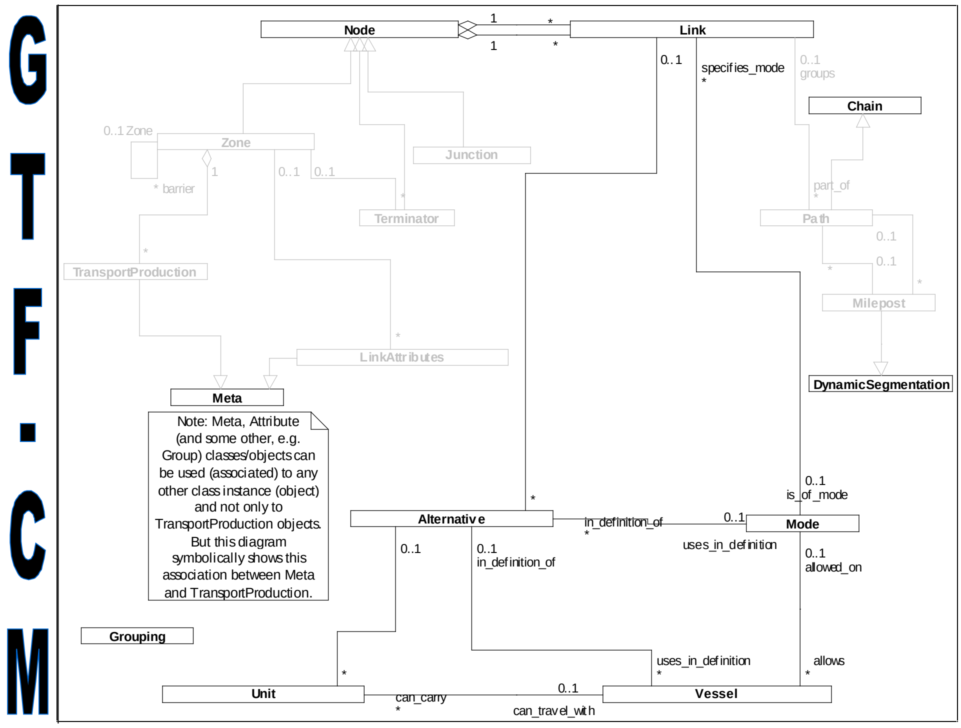

Current situation
Current Data Pool
Manifold Softwares
Inhomogeneous SOFTWARE structure
Manifold Data Pool
Inhomogeneous INFORMATION structure
Client#1
Client#2
...
National O.
International Organisations
National Sources
...
MKmetric

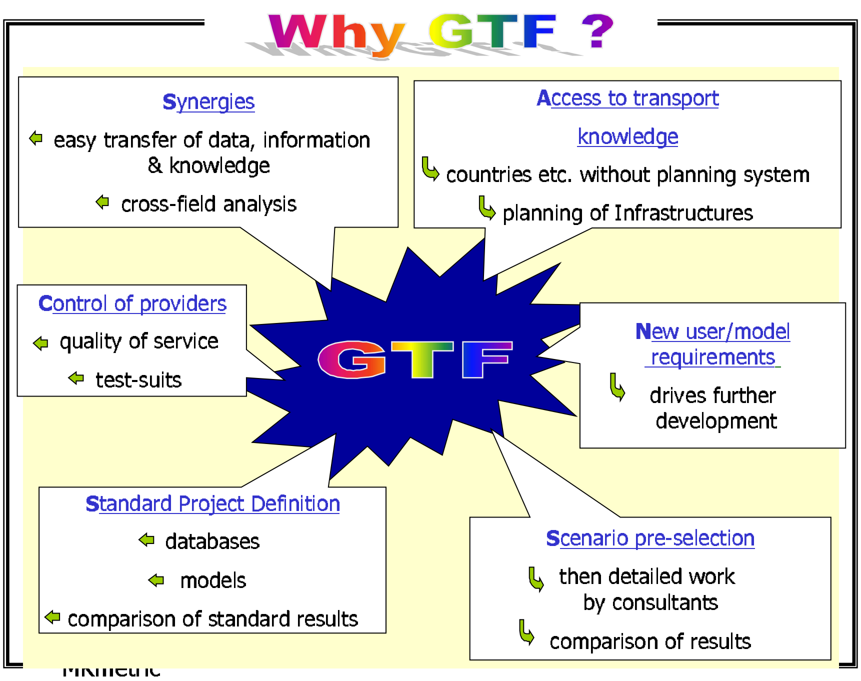

Problems
Matching Data Models 1
Data Model X
Data Model Y
Data Model Z
Problem: Incompatible Informational Unit Sizes
MKmetric


Problems
Matching Data Models 2
Data Model X
Data Model Y
Data Model Z
Problem: Incompatible Informational Unit Sizes
MKmetric


Solution
Vision & Concept
Manifold Softwares
Client#1
Client#2
...
Manifold Data Pool
GTF Translators
HOMOGENEOUS information structure
DB-1
DB ...
DB-2
...
MKmetric


Solution
Matching Data Models using GTF
Data Model X/Y/Z
GTF
Data Model Z/Y/X
Solution GTF: „Atomic“ Informational Unit Sizes
MKmetric


G
T
F
.
C
M
Node
Link
Chain
Zone
Junction
Terminator
Path
TransportProduction
Milepost
LinkAttributes
DynamicSegmentation
Meta
Note: Meta, Attribute (and some other, e.g. Group) classes/objects can be used (associated) to any other class instance (object) and not only to TransportProduction objects. But this diagram symbolically shows this association between Meta and TransportProduction.
Alternative
Mode
Grouping
Unit
Vessel
specifies_mode
groups
part_of
barrier
is_of_mode
in_definition_of
uses_in_definition
allowed_on
allows
can_carry
can_travel_with


Why GTF ?
Synergies
easy transfer of data, information & knowledge
cross-field analysis
Access to transport knowledge
countries etc. without planning system
planning of Infrastructures
Control of providers
quality of service
test-suits
GTF
New user/model requirements
drives further development
Standard Project Definition
databases
models
comparison of standard results
Scenario pre-selection
then detailed work by consultants
comparison of results

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AVV (van der Loop): Transport Policy Systems in The Netherlands

Transport policy support systems in the Netherlands

Han van der Loop

Ministry of Transport,

AVV Transport Research Centre

VMM-3004/01

Contents

- Objectives Spotlights
- Method
- Conceptual framework
- Results
  - formulation of policy objectives
  - evaluating policy options (ex ante)
  - monitoring implementation
  - explaining developments (ex post)
- conclusions

Objective

Objective Spotlights TN:

- **“How to make transport studies transparent to end-users and more integrated into policy-making processes?”**

Two objectives:

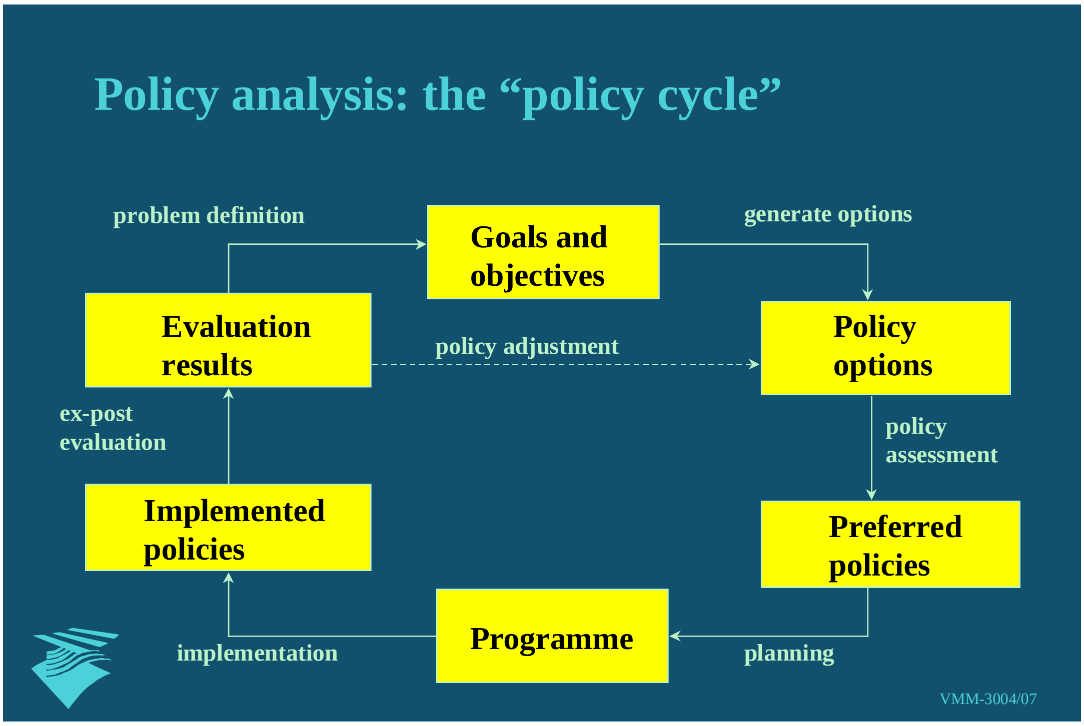
- **How to apply the knowledge from transport studies in the policy process (to take better decisions and to a better practice)?**
- **How to introduce knowledge generated by transport studies to the policy-makers?**

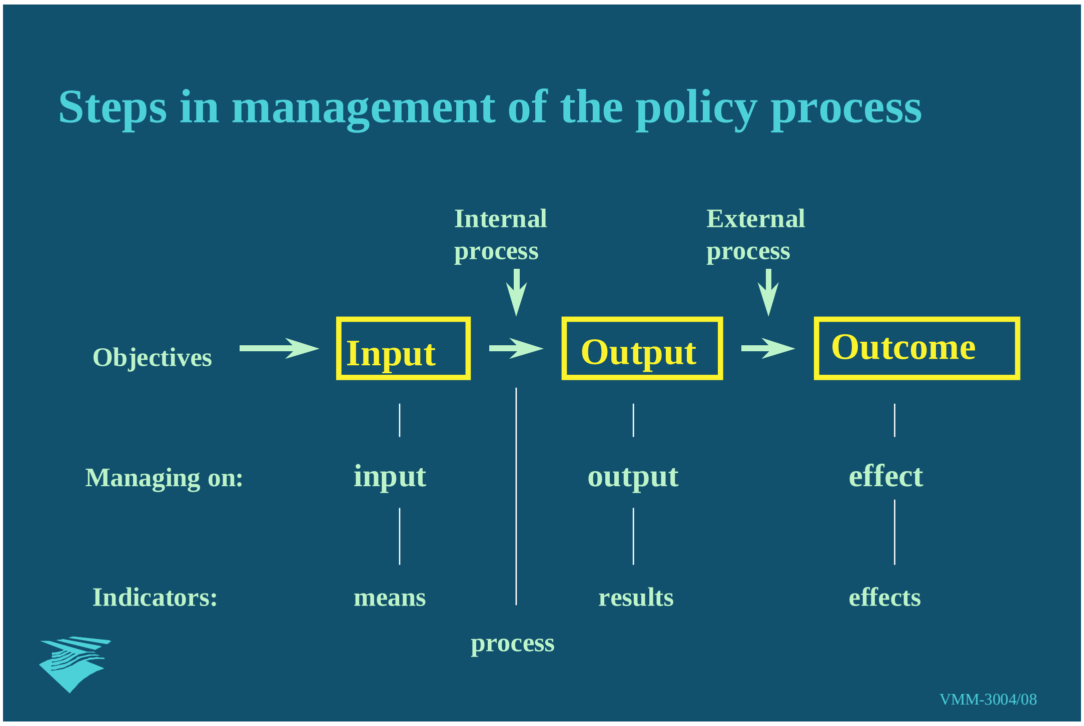
VMM-3004/02

Method

- How does the policy process take place?
- How has knowledge from transport studies in the Netherlands been used in the policy process (to take better decisions and for a better practice)?
- How has knowledge from transport studies been introduced to policy-makers in the Netherlands?

VMM-3004/02


Policy analysis: the "policy cycle"
problem definition
Goals and objectives
generate options
Evaluation results
policy adjustment
Policy options
ex-post evaluation
policy assessment
Implemented policies
Preferred policies
implementation
Programme
planning
VMM-3004/07


Steps in management of the policy process
Internal process
External process
Objectives
Input
Output
Outcome
Managing on:
input
output
effect
Indicators:
means
results
effects
process
VMM-3004/08

"To measure is to know": the method in steps

1) Formulate objectives and measures
2) Define indicators
3) Measure
4) Estimate development of indicators:
   - if policy will not change
   - if policy will be implemented
5) Describe and explain developments
6) Draw conclusions + adjust plan

VMM-3004/09

How to define policy objectives? 1. Content

Policy objectives for the future should be:

- **clear, unambiguous and understandable**
- **possible to measure objectively (qualitatively or preferably quantitatively): possible to collect and use data**
- **approved by the Parliament**

VMM-3004/02

Results: 1. Objectives in Second Transport Structure Plan 1986-2010

Many quantified targets in 2010 (1986 = 100%)

- **Maximum growth passenger car km: 135%**
- **NOx emission by cars: 25%**
- **CO2 emission by road traffic: 90%**
- **Road fatalities: 50%**
- **# people injured + hospitalised: 60%**
- **Maximum probability of being confronted with congestion:**
  a) on trunk roads 2%
  b) on the other parts of the trunk road network 5%

VMM-3004/10

Objectives and indicators NVVP 2001-2020

Objectives	Indicators
• Accessibility - networks - users	• - Mean speed truck road network peak < 60 k/u • - capacity to accommodate + 50%/100% in 2020
• Safety	• fatalities/injuries
• Environment	• emissions, noise
• Decentralisation	• agreements between central and local government

New budget system national government

The **budget report** should mention:

- the objectives of policy
- the planned measures
- the costs of these measures.

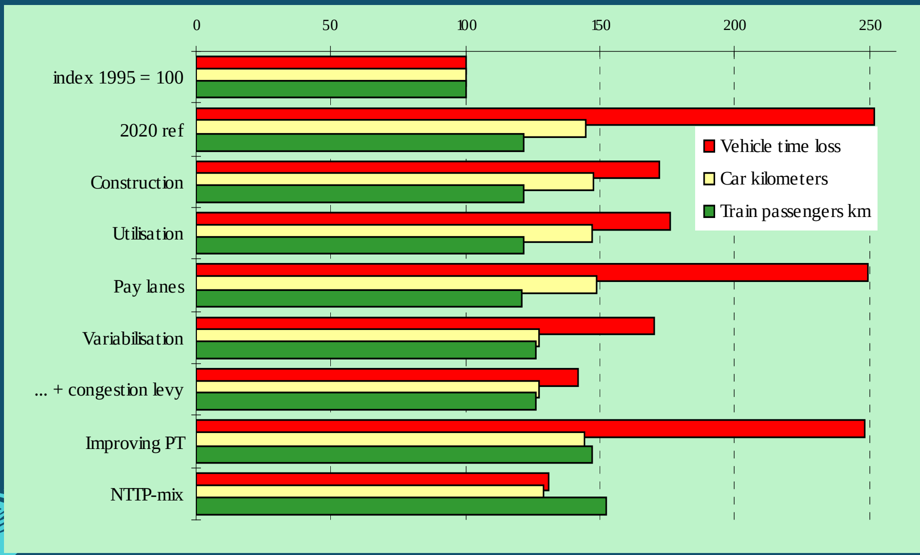
The **report accounting for the policy**:

- were the objectives reached?
- were the planned measures realised?
- which costs were made?

How to formulate policy objectives? (Process)

1. Formulation by policy-makers
2. Advise to make monitoring possible
3. Develop commitment and tools
4. Keep it simple and flexible
5. Regulations can help

Results 2. Evaluating policy options (ex ante)



Results 2. Evaluating policy options (ex ante)

Comparison of the assumed development of the key influencing factors

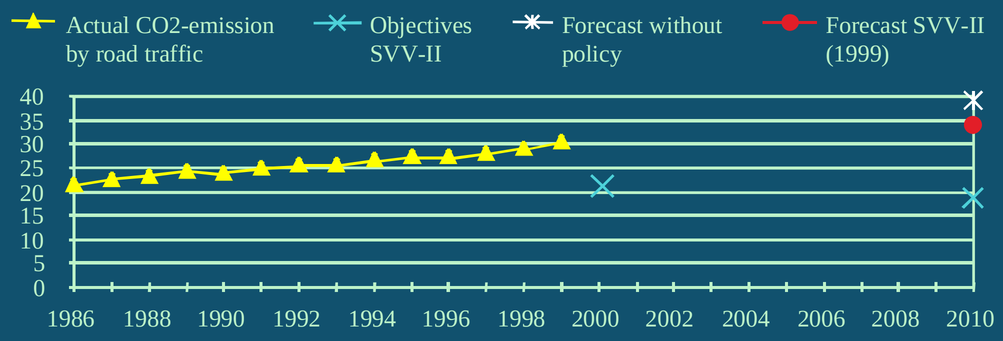
	Growth 1970-1995	1995-2020 DE	EC	GC
Population	+ 19%	+ 5%	+ 14%	+ 9%
Number of persons, age group 20-65	+ 38%	+ 2%	+ 7%	+ 4%
Households	+ 59%	+ 16%	+ 19%	+ 25%
Employment (in labour years)		+ 5%	+ 25%	+ 28%
Passenger cars	+ 130%	+ 44%	+ 56%	+ 59%
Trunk road section length	+ 108%	+ 15%	+ 15%	+ 15%
Intercity travel time	- 50%	nk	+ 7%	nk
Fuel cost/km	+ 7%	nk	- 12%	nk
GDP	+ 75%	+ 45%	+ 93%	+122%

Results: 3. Monitoring implementation (Policy Effect Report)

- a yearly report since 1992
- describes objectives, developments of indicators, gives explanation of developments, expected developments and conclusions indicating whether the objectives will be reached
- available for new budget preparation

VMM-3004/12

Development of CO2 emissions through transport in the Netherlands (x 1000 kiloton)



VMM-3004/13

Adjustment of objectives and/or measures was made explicit

E.g. Accessibility Plan, 1996-2005:

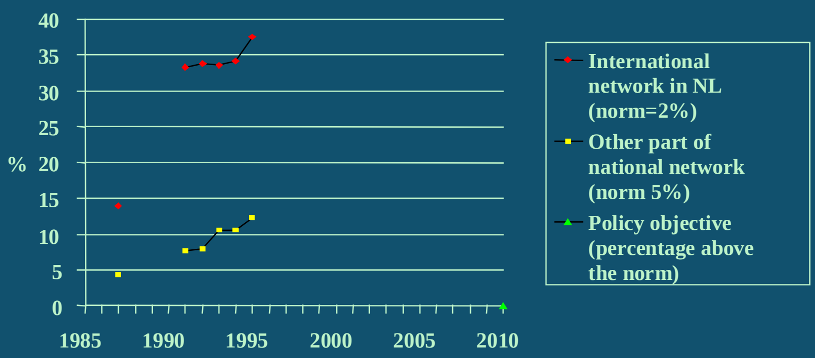
- congestion 90-95 (ex post) higher then forecasts (ex ante) made in 1990

- acceleration and intensification of measures

- new objective: "free flow of traffic with an economic function on main roads to the main cities in 2005"

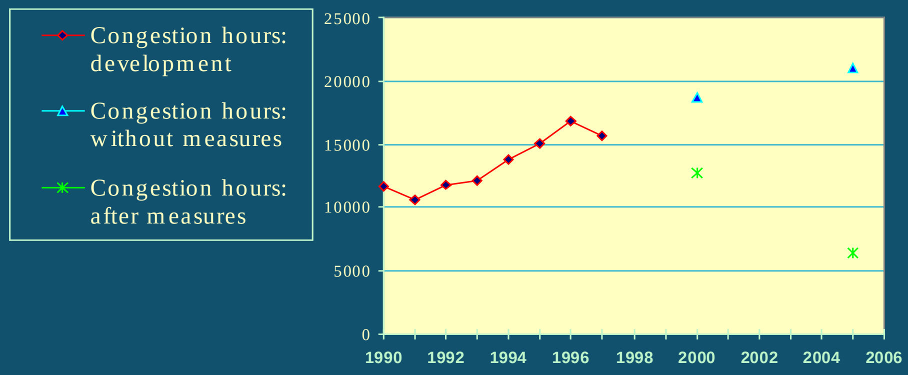
VMM-3715/02

Part of trunk road network with higher probability of congestion then the norm



VMM-3715/01

Vehicle time lost to congestion in the Randstad (hours x 1000)



VMM-3004/15

Results: 4. Explaining developments (evaluation ex post)

Full explanation of relationship between plan and outcome was nearly impossible, therefore:

- **Make use of 'effect matrix'**
- **Make use of expert judgement**
- **"Keep it clear and simple"**
- **Continue development of methodology**

VMM-3004/16

The plan - Goals -

			Goals		
			Outcome 1	Outcome 2	Outcome 3
			x	x	x

VMM-3004/17

The plan - interventions -

Interventions	Output	Knowledge about relation output / outcome	Goals		
			Outcome 1	Outcome 2	Outcome 3
Measure	x	x	x		
*.......	x	x		x	x
*.......	x	x		x	
Measure n	x	x	x	x	x
			x	x	x

VMM-3004/18

The plan - in its environment

Interventions	Output	Knowledge about relation output / outcome	Goals		
			Outcome 1	Outcome 2	Outcome 3
Measure 1	x	x	x		
*.......	x	x		x	x
*.......	x	x		x	
Measure n	x	x	x	x	x
Extern.fact. 1	x	x			
*.......	x	x		x	x
Extern.fact. n	x	x	x		x
			x	x	x

VMM-3004/19

The ideal monitoring system

Influencing factors	Result indicator	Knowledge about relation measure / effect	Effect indicators		
			Effect 1	Effect 2	Effect 3
Measure	☺	☺	☺		
*.......	☺	☺		☺	☺
*.......	☺	☺		☺	
Measure n	☺	☺	☺	☺	☺
Extern.fact. 1	☺	☺			
*.......	☺	☺		☺	☺
Extern.fact. n	☺	☺	☺		☺
			☺	☺	☺

VMM-3004/20

Reality

Influencing factors	Result indicator	Knowledge about relation measure / effect	Effect indicators		
			Effect 1	Effect 2	Effect 3
Measure	☺	☺	☺		
*.......	?	?		?	?
*.......	?	?		?	
Measure n	?	☺	?	?	?
Extern.fact. 1	?				
*.......	?	☺		☺	?
Extern.fact. n	☺	?	☺		?
		?	?	?	☺

VMM-3004/21

A good start

Influencing factors	Result indicator	Knowledge about relation measure / effect	Effect indicators		
			Effect 1	Effect 2	Effect 3
Measure	☺	☺	☺		
*.......	☺				
*.......	☺				
Measure n	☺	☺			
Extern.fact. 1	☺				
*.......	☺	☺		☺	
Extern.fact. n	☺		☺		
			☺	☺	☺

VMM-3004/22

Concluding statements

When setting up a system for systematic monitoring of policy effects,

- **“KEEP IT CLEAR AND SIMPLE” should be the motto**
- **The possible tension between evaluation for ‘accounting’ and for ‘learning’ should be recognised**
- **Output and result indicators should not be forgotten, as they are essential for the explanation of policy effects**

Concluding statements

- **Policy analysis can offer a helpful conceptual framework**
- **What knowledge is useful for policy depends on the stage of the policy process**
- **Careful timing is vert important**
- **Concrete results of studies should be presented**

See also “Annex: AVV (van der Loop): Transport Policy Systems in The Netherlands”

2.2. Government of Catalonia (Baulies): The Policy Support System of Catalonia: GIS-PTOP

Regional **Transport** **Urban**



The Spatial Policy Support System of Catalonia
GIS-PTOP

Xavier Baulies
Head of the System
Government of Catalonia

Andreu Ulied
Expert Advisor
Mcrit

The Spatial Policy Support System of Catalonia GIS-PTOP

Current situation

User-Needs

System-Requirements

System-Architecture

Implementation plan

Data Model Questions

Current situation

Different systems managed by different services with heterogenous development levels.

"Spontaneous co-ordination" or "gradual reforms" are unfeasible in practice because of the rigidities and inerties created in all the different systems, specially due to:

•the lack of explicit metadata procedures and
•the use of heterogeneous Data Models.

There is a "**need for a radical change**" to create a new system which can not be just the "addition of existing pieces".

The Spatial Policy Support System of Catalonia will be defined with a global top-down approach, and implemented with a bottom-up inclusive strategy.

User-needs

•Cross-sectorial: to assess urban, transport and regional policies

•Multi-scale integration:

- •Useful for mangement (e.g. Road maintenance...)
- •Useful for planning (e.g. Road traffic forecast...)

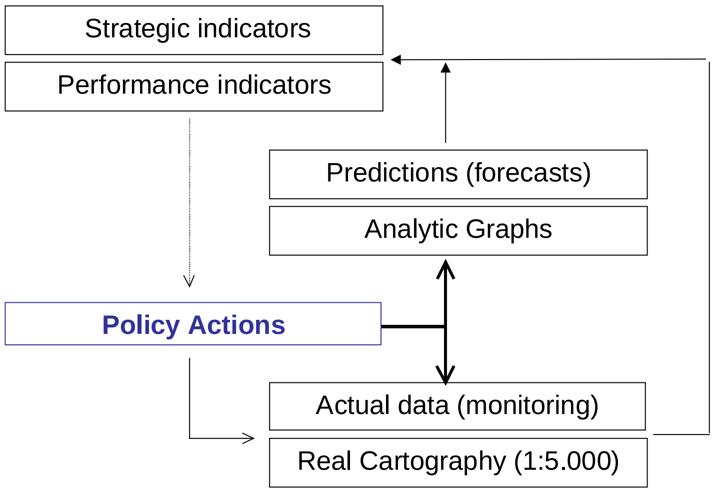
•Comprehensive service provision:

- •information
- •forecast
- •evaluation
- •decision-support

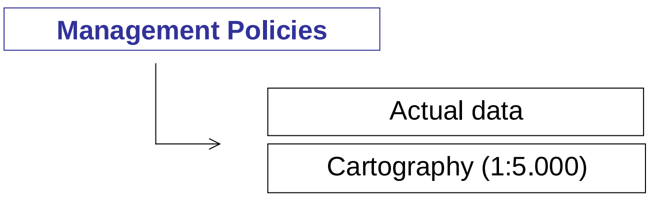
•Cutomised: for different user-profiles

- •Useful for policy-makers (friendly access to key modules)
- •Useful for funcionaires and/or policy-analysts
- •Useful for citizens (dissemination to key information)

System requirements: Functional architecture



Policy actions are both “**Management policies**” and “**Strategic policies**”.

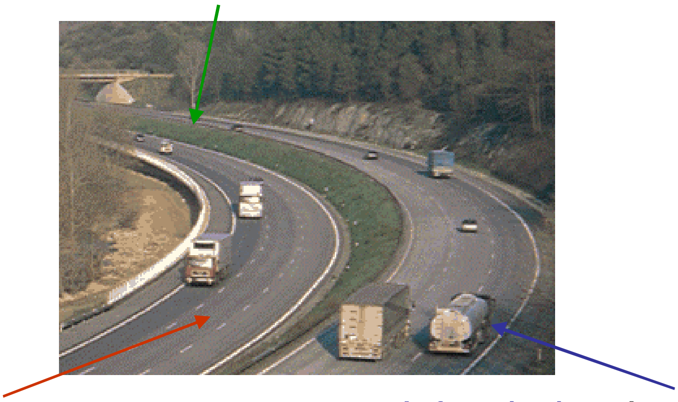


“Real data” captured by a variety of sensors and automatically stored in a 1.5.000 cartography

Monitoring “Performance Indicators”

Performance indicators

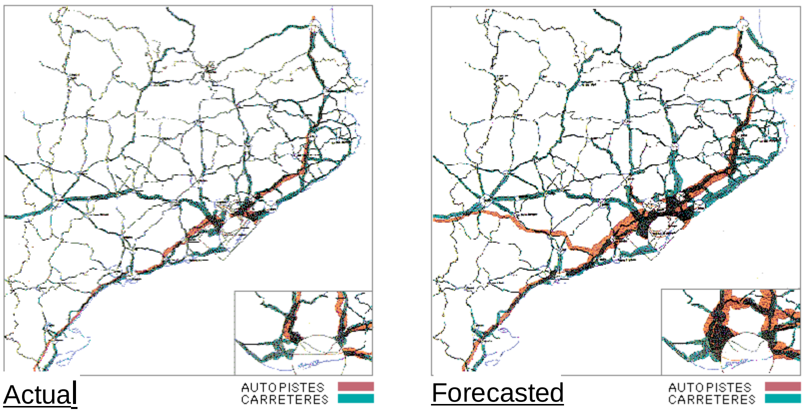
Minimum threhold levels have to be permanently assured in a cost-effective manner



Predictions (forecasts)

Analytic Graphs

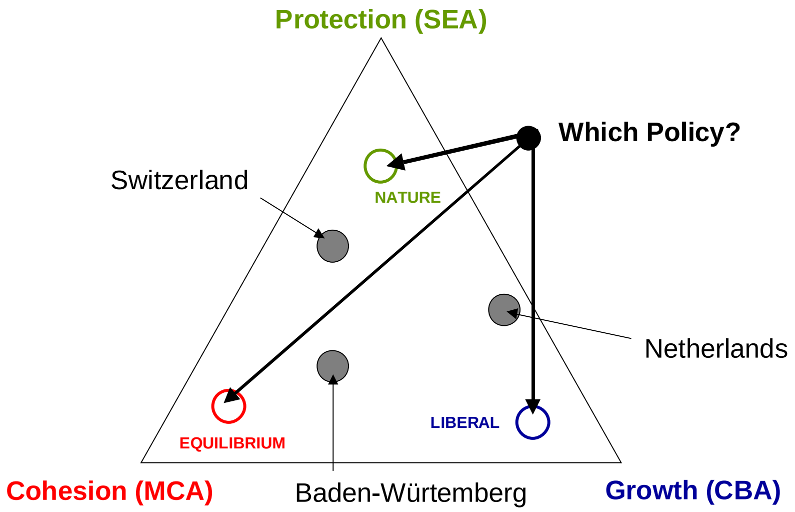
Strategic Policies



Forecasting the impacts of policy actions

Strategic indicators

CBA, MCA and SEA methods to evaluate and rank strategic long-term plans

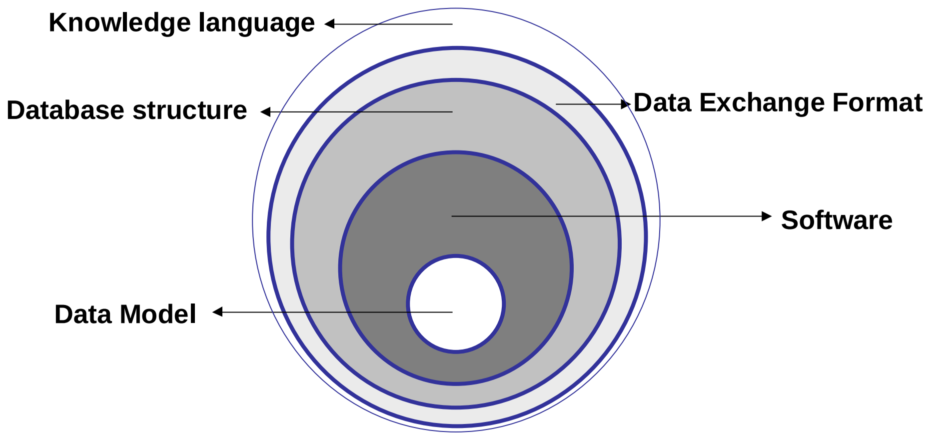


System-architecture

- **Centralised system administration** and strict metadata protocols
- **Single Data Model** for the whole system (based on GTF extended to cover Urban and Territorial aspects explicitely)
- **Standard software platform:** Database management (ORACLE) and GIS (Geomedia) as a reference platform for information management.
- **Specialised modules** for advanced analytic tasks, forecast and decision-support using the most suitable software, and sharing the Data Model and exchange formats to guarantee full compatibility
- **Highly customised user-interfaces** for different information management tasks built upon standard tools whenever is feasible (Desktop mapping, text editors, spreadsheets and multimedia software for communication and visualisation purposes).

System's Ontology

"As deeper the incompatibility, as difficult to solve becomes"



The definition of a Data Model is the necessary first step to build up open and inclusive multi-software system

Development and implementation plan

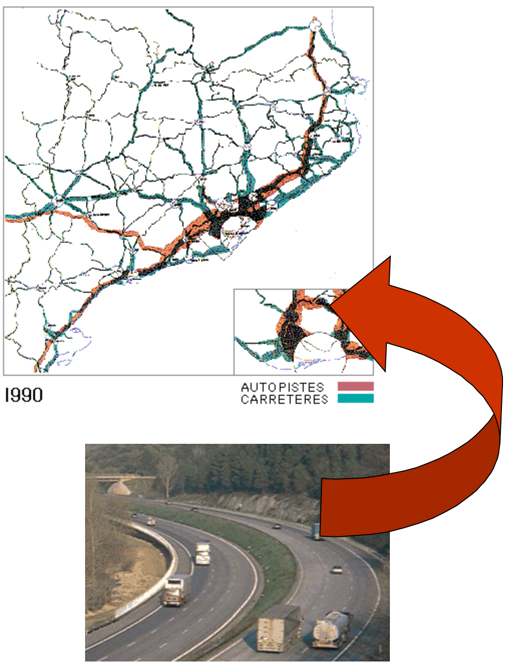
GIS-PTOP

- Development of the **Road Policy Support System**
  - Definition of performance indicators to be monitored (2001)
  - Definition of the Road Data Model (2001)
  - Development of the modules (Maintenance and Signalling, Traffic counts, Safety...) (2002)
  - Implementation of the system (2002)
- Definition of the Data Model for the whole system (2001-2002)
- Development of a prototype for the whole system (Electronic Atlas) to facilitate future users active participation in the process (2002)
- Future development of the whole system (2003 and beyond)

Data Model Questions under study

GIS-PTOP

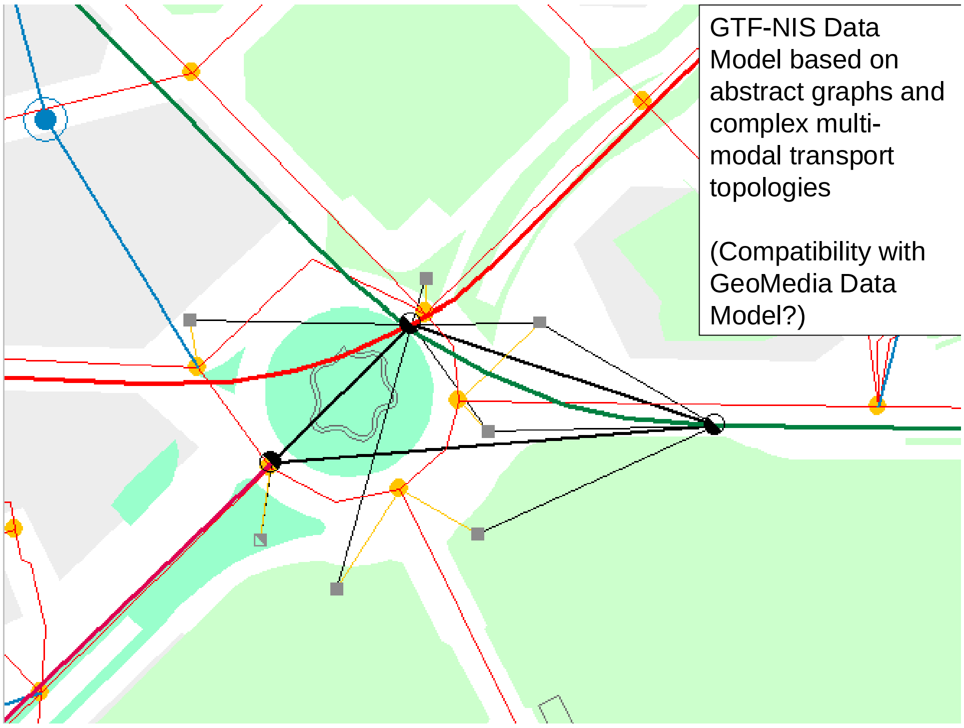
- How to integrate multi-scale levels?
  - "Real" maps
  - Abstract graphs
- How to explicitly include as time-dependent "events" such as accidents, congestion... as well as management and strategic policies?
- How to integrate the logics of multi-sectorial levels?
  - Transport System
  - Urban System
  - Regional System
- What balance between centralised communication procedures and highly de-centralised and customised modules can be achieved?



How to integrate on-line "real" data within an information system having the complex topologia needed to support trafficmodelling?

GeoMedia Data Model based on"Real Cartography" and Dynamic Segmentation

(GDF-UNETRANS compatibility?)



GTF-NIS Data Model based on abstract graphs and complex multi-modal transport topologies

(Compatibility with GeoMedia Data Model?)

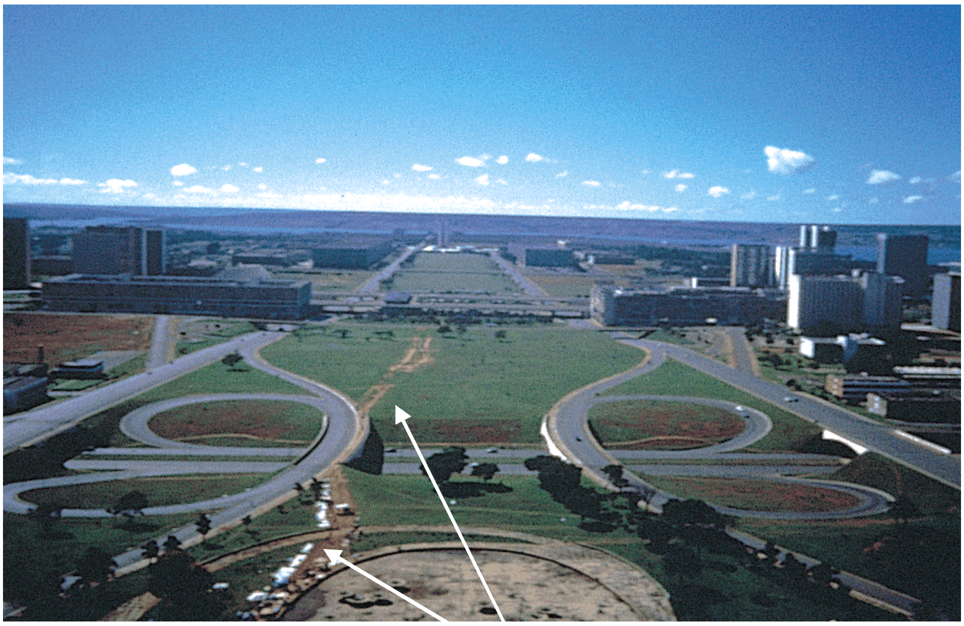
Working hypothesis to be validated...

•A single Data Model for both real maps and abstract graphs (which should be GTF since it is the more abstract and generalised).

•Two independent databases concerning entities and relationships

- •Real cartography at 1:5.000 supported by Dynamic Segmentation (Geomedia Transport Data Model, UNETRANS, GDF...)
- •Abstract graph supported by the Complex Topology needed to be linked to traffic forecast models (GTF...)

•Specialised routines to capture data attached to anyone of these two levels, process it, and exchange with the other level based on explicit rules (Expert System).



Not everything can be covered: Spontaneous pedestrian path in Brasilia

2.3. DTU (Prof Nielsen): Problems and Solution leading to GTF

spotlightsTN GTF

Otto Anker Nielsen

Technical University of Denmark (DTU)

Centre for Traffic and Transport (CTT)

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Eduard Ruffert & Dr. Benedikt Mandel

email: ruffert@mkm.de & mandel@mkm.de

MKmetric Gesellschaft für Systemplanung mbH, Karlsruhe

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The presentation

- Goals
- Current situation, problems and solutions
- What is GTF
- Principles in GTF
- Work process in SPOTLIGHTS
- Common Understanding
- Possible benefits and the road ahead

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Current situation and problems

Software and model issues

Models at EU-level require data from many sources, BUT:

- Software and databases are inhomogeneous and incompatible from each other
- Exchange of data is difficult due to differences in conceptual models, definitions, formats and implicitly given meta-data
- Software is not fully documented, transparent and open

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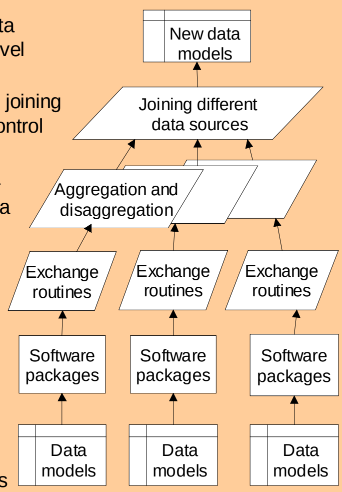
Possible problems integrating models and data sources

Processes and models



Problems	Consequences
Implicitly given meta data and quality level	The combined datamodel does not utilise the information provided by the data and software sources
Simplified tools for joining data and quality control	Connectivity and consistency problems are added
Difficulties in (dis)-aggregation of data	Data and topologic information is lost
Insufficient translation routines	Metadata is lost
Inhomogenious formats and levels of aggregation	Not all information is transferred
Inhomogenious structures, non-transparent models	The data is not optimal comparing to the software and methods

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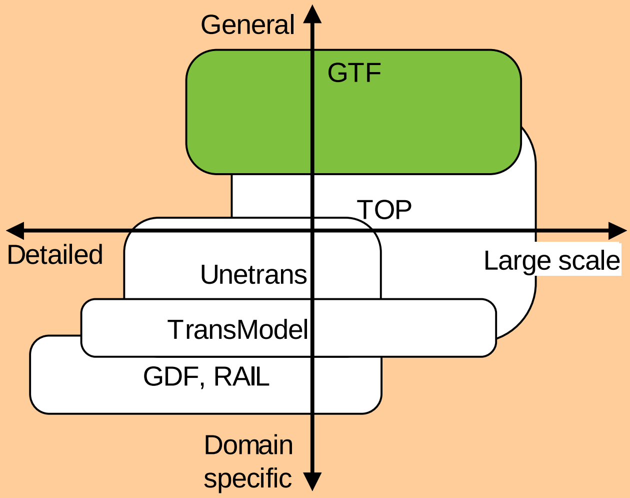
What is GTF ?

Comparison with other formats



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Response and discussion: Problems of complexity

Problems of complexity

- A too simple format

  => Information and data is lost, why is will be of little use

- A too complex format

  => Difficult to understand and implement, few will be able to use it

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Response and discussion: Solutions

Technical solutions

- Extend GTF-core, if several modellers request it
- Extend GTF with parent and sub-classes, when few request it
- Extend GTF with tailor-made additions only for rare cases

=> A steady organisation must take on the coordination responsibility

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Response and discussion: Organisational issues

Organisational issues

- Software providers may want to “trap” their customers
- Funding is low for modelling, especially for software development
- Data are non-public due to commercial, organisational or political reasons

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Common Understanding

Suggestions/ambitions (not yet agreed upon):

- The European Commission agrees to use GTF
- Provides funding to finalise GTF into
  - An operational format
  - Open source
  - GTF Reader/writer library of common functions
- Provides training workshops
- Modellers implement GTF and import-export filters to their software
- EC submit GTF to a world wide standards board
- EC will keep the GTF web discussion forum or the GTF mailing list open and permanent

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2.4. MKmetric (Ruffert): Introduction to GTF Conceptual Model

spotlightsTN GTF

1. Goal & Motivation of spotlightsTN/GTF
2. Principles of development
3. GTF-CM / Examples

Eduard Ruffert & Dr. Benedikt Mandel

email: ruffert@mkm.de & mandel@mkm.de

MKmetric Gesellschaft für Systemplanung mbH, Karlsruhe

11/12th October 2001 Barcelona MKmetric

Goal of spotlightsTN/GTF

- Get the modelling community in Europe (in the World) to "establish the necessity of a common exchange format for transportation models"

  ⇒ suggestion of a conceptual view as a basis

- contact modellers / software providers
- discuss GTF Goal

  ⇒ means for discussion: GTF-CM

  ⇒ discuss GTF-CM:
  - Email spotlights@mkm.de
  - Forum gtf.mkm.de
  - Mailinglist gtf@lists.mkm.de

Outcome: Agreement & Common Understanding

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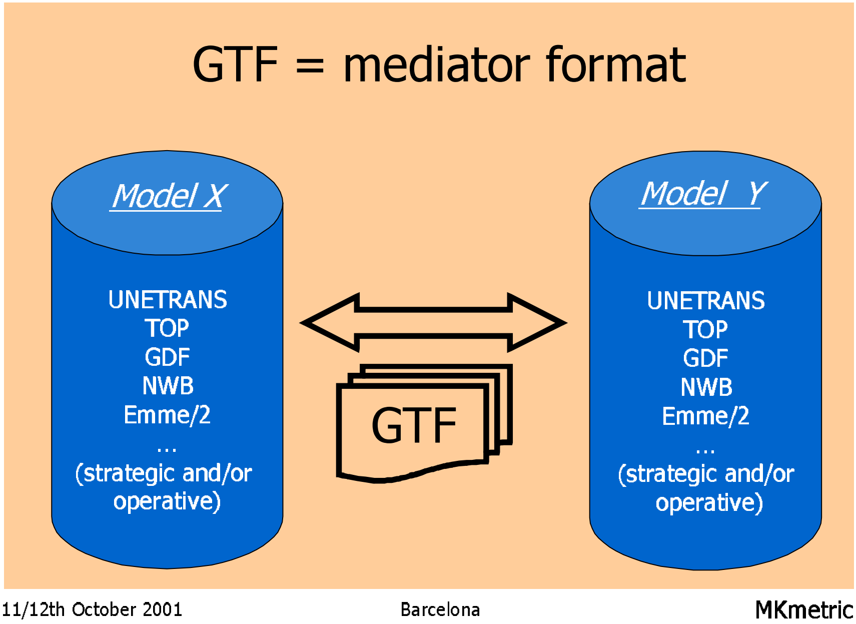
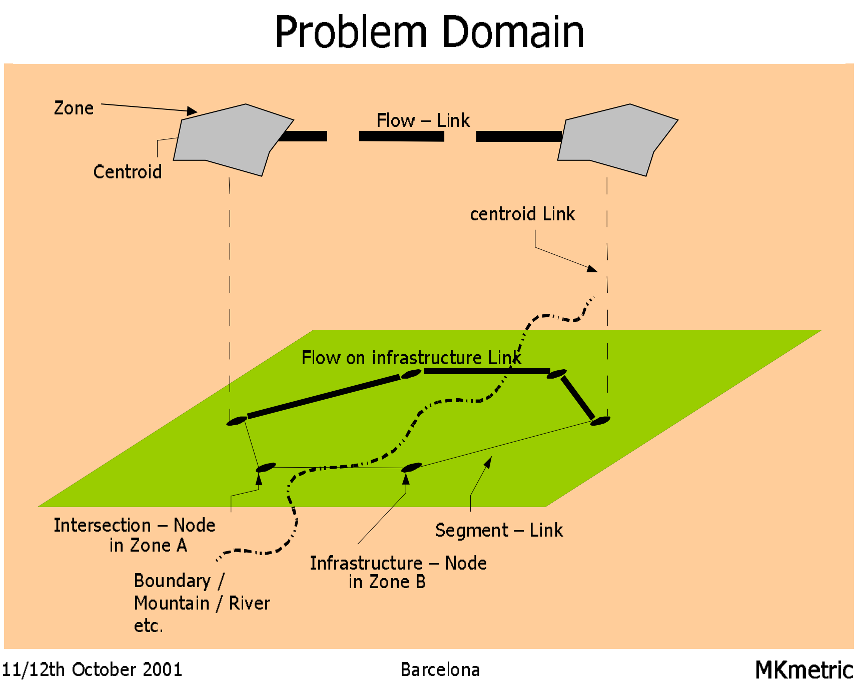
GTF usage


GTF = mediator format
Model X
UNETRANS
TOP
GDF
NWB
Emme/2
...
(strategic and/or
operative)
Model Y
UNETRANS
TOP
GDF
NWB
Emme/2
...
(strategic and/or
operative)
GTF
11/12th October 2001
Barcelona
MKmetric


Problem Domain
Zone
Centroid
Flow – Link
centroid Link
Flow on infrastructure Link
Intersection – Node
in Zone A
Segment – Link
Infrastructure – Node
in Zone B
Boundary /
Mountain / River
etc.
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Barcelona
MKmetric

OO concepts overview

Concepts

• generalistion, typing

rectangle, circle, triangle “are” a kind of shape

• encapsulation

class = members (data) + methods (procedures)

• polymorphism

two methods, same name

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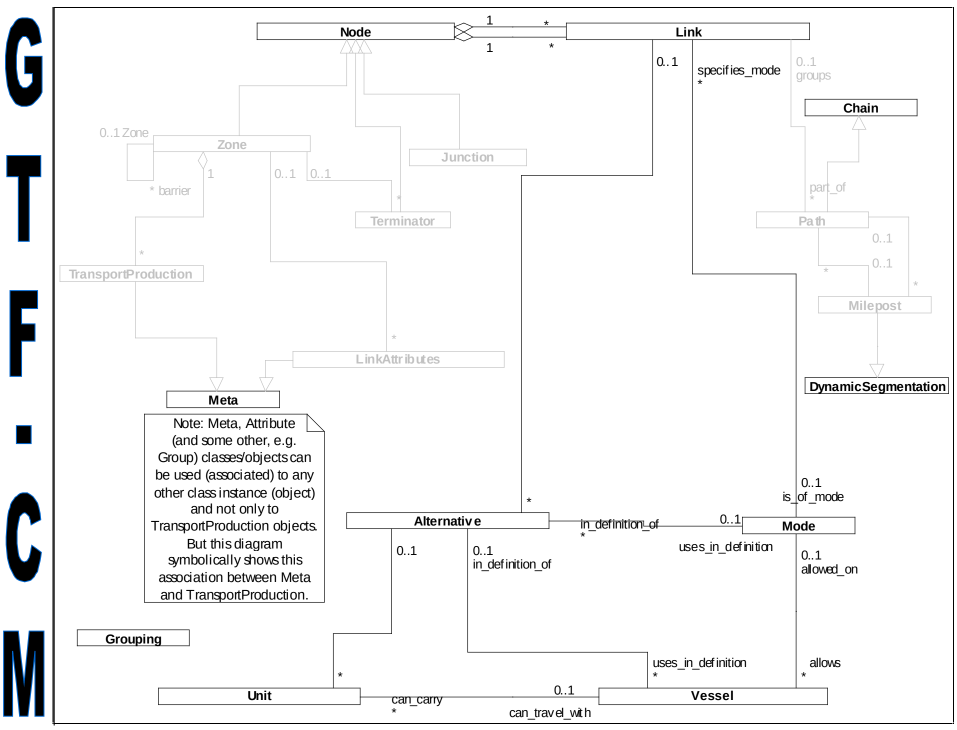
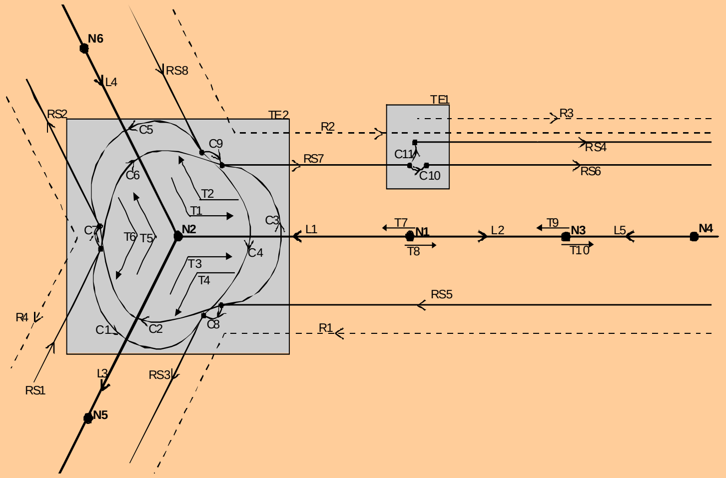


Example application 1: Transport terminal



schematic view of a public transport terminal*

*taken from the BRIDGES/D4 report "Handling Traffic Modelling Networks in GIS" by DTU/TetraPlan

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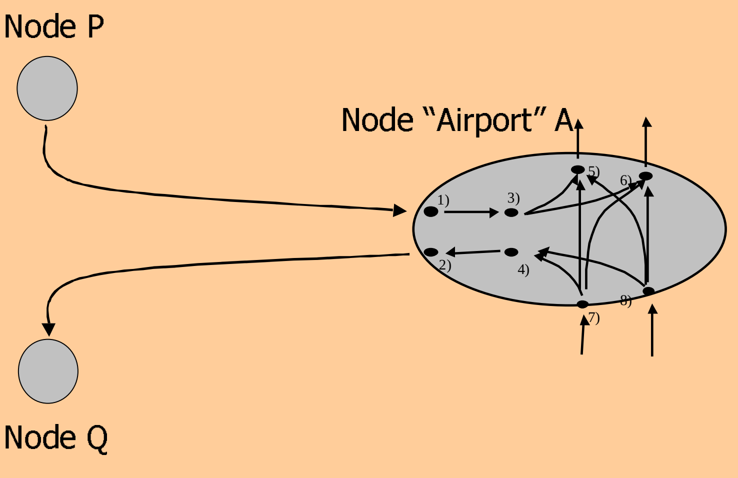
Example application 1: in GTF terms



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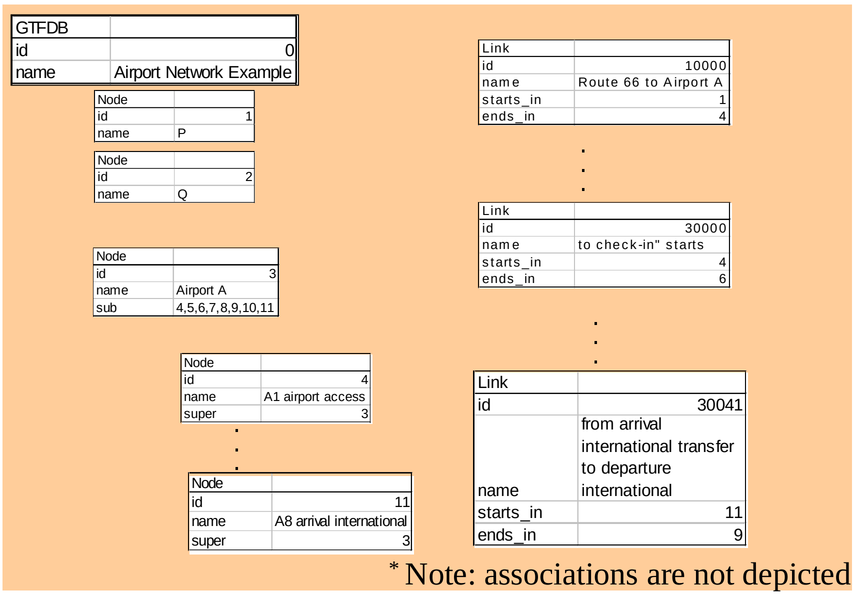
Example application 1: GTF objects



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Example application 1: XML file

```
<!-- definition of the Airport Node-Network example-->
<GTFDB id=1 name="Airport Network Example">
        <N id=”1” name=”P”>
        </N>
        <N id=”2” name=”Q”>
        </N>
<!-- definition of the internal Nodes -->
<N id=”3” name=”Airport A”>
        <N id=”4” name="A1 airport access">
        </N>
        <N id=”5” name="A2 airport egress">
        </N>
        <N id=”6” name="A3 check-in counter">
        </N>
        <N id=”7” name="A4 check-out counter">
        </N>
        <N id=”8” name="A5 departure national">
        </N>
        <N id=”9” name="A6 departure international">
        </N>
        <N id=”10” name="A7 arrival national">
        </N>
        <N id=”11” name="A8 arrival international">
        </N>
</N>
<!-- definition of the link from Node O to Airport A -->
<L id=”10000” name="Route 66 to Airport A" starts_in="1" ends_in="4">
</L>
<!-- definition of the link from Airport A to Node D -->
<L id=20000 name="Highway 928" starts_in="5" ends_in="2">
</L>
<!-- definition of the internal links of Node Airport A-->
<L id=30000 name="to check-in" starts_in="4" ends_in="6">
</L>
<L id=30001 name="from check-out " starts_in="7" ends_in="5">
</L>
<L id=30010 name="to departure national" starts_in="6" ends_in="8">
</L>
<L id=30011 name="to departure international" starts_in="6" ends_in="9">
</L>
<L id=30020 name="from arrival national" starts_in="10" ends_in="7">
</L>
<L id=30021 name="from arrival international" starts_in="11" ends_in="7">
</L>
<L id=30030 name="from arrival national transfer to departure national" starts_in="10" ends_in="8">
</L>
<L id=30031 name="from arrival national transfer to departure international" starts_in="10" ends_in="9">
</L>
<L id=30040 name="from arrival international transfer to departure national" starts_in="11" ends_in="8">
</L>
<L id=30041 name="from arrival international transfer to departure international" starts_in="11" ends_in="9">
</L>
<GTFDB>
```

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Example application 2: Socio-Economic data

Zone	**Population**	**Income** [EURO / pers.]	**GDP** [bill. EURO]	**...**
1	150000	10000	"5.7"	
2	67000	11300	"6.3"	
3	82000	9500	"5.2"	
...				

*

* Note: data are fictive

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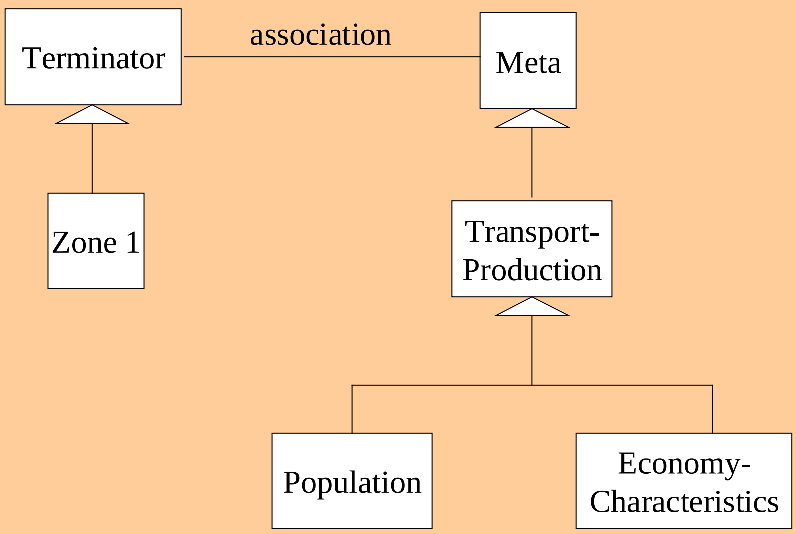
Example application 2: in GTF terms



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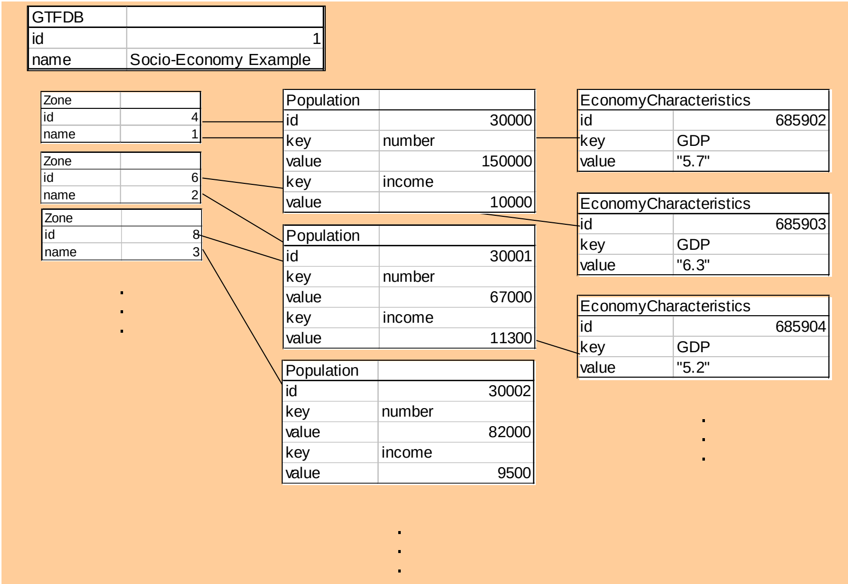
Example application 2: GTF objects



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Example application 2: XML file

```
<!-- definition of the Socio-Economic data Example-->
<GTFDB id=1 name="Socio-Economy Example">
        <N id= "2">
                <TE id= "3">
                        <ZO id= "4" name= "1">
                </TE>
                <TE id= "5">
                        <ZO id= "6" name= "2">
                </TE>
                <TE id= "7">
                        <ZO id= "8" name= "3">
                </TE>
        </N>
        <M>
                <TP>
                        <POP id= "30000" number = "150000" income= "10000" associations= "1">
                        <ECH id= "685902" GDP= "5.7" associations= "1">
                        <POP id= "30001" number = "67000" income= "13000" associations= "2">
                        <ECH id= "685903" GDP= "6.3" associations= "2">
                        <POP id= "30002" number = "82000" income= "9500" associations= "3">
                        <ECH id= "685904" GDP= "5.2" associations= "3">
                </TP>
        </M>
<GTFDB>
```

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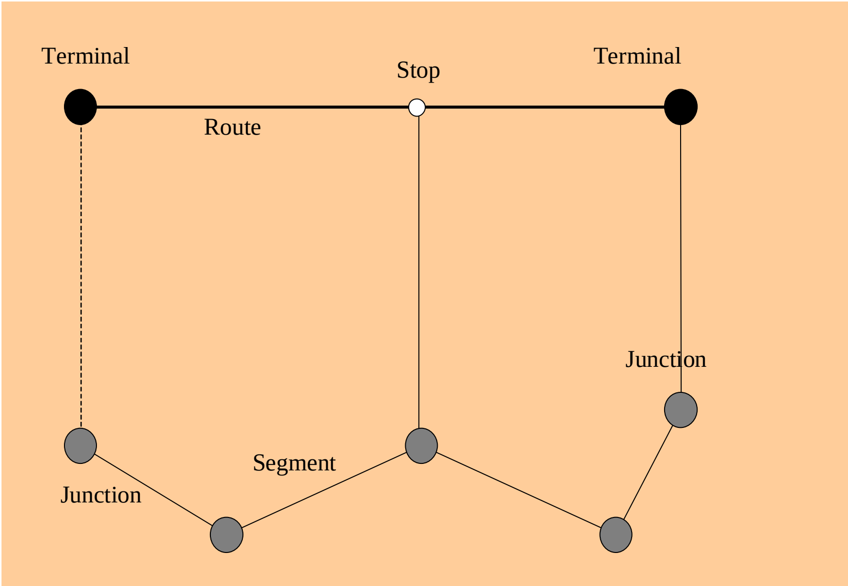
Example application 3: Public Transport



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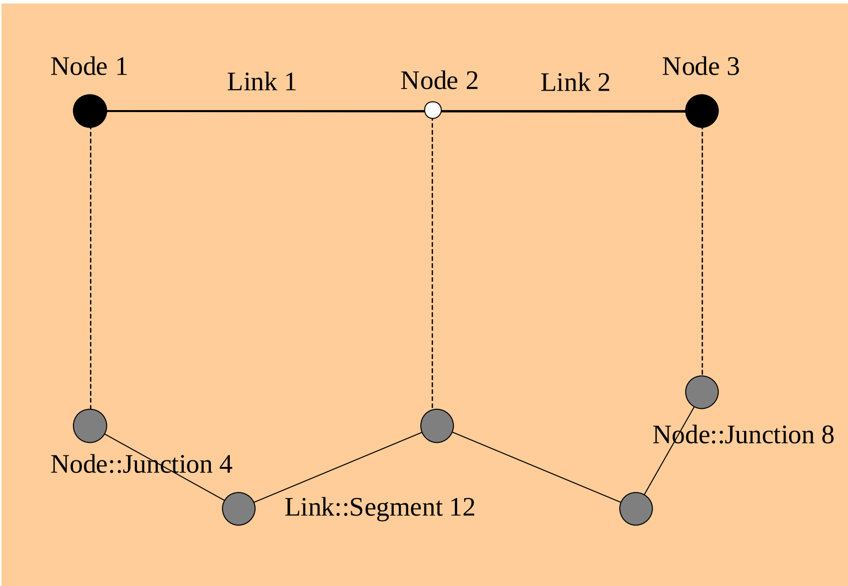
Example application 3: in GTF terms



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Example application 3: GTF objects

GTFDB	
id	0
name	Public Transport Example

Node	
id	1

Node	
id	2

Node	
id	3

Link	
id	10

Link	
id	11

Junction	
id	4

Junction	
id	5

Junction	
id	6

Junction	
id	7

Junction	
id	8

Junction	
id	9

Segment	
id	13
starts_in	5
ends_in	6

Segment	
id	19
starts_in	8
ends_in	9

Segment	
id	15
starts_in	6
ends_in	7

Segment	
id	17
starts_in	7
ends_in	8

* Note: associations are not depicted

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Example application 3: XML file

```
<!-- definition of the Public Transport example-->
<GTFDB id= "0" name= "Public Transport Example">
        <N id= "1">
        </N>
        <N id= "2" type= "stop">
        </N>
        <N id= "3">
        </N>
        <N id= "4">
                <JU id= "5" associations= "1">
                <JU id= "6">
                <JU id= "7" associations= "2">
                <JU id= "8">
                <JU id= "9" associations= "3">
        </N>
        <L id= "10" starts_in="1" ends_in="2">
        </L>
        <L id= "11" starts_in="2" ends_in="3">
        </L>
        <L id= "12">
                <SEG id= "13" starts_in= "5" ends_in= "6">
        </L>
        <L id= "14">
                <SEG id= "15" starts_in= "6" ends_in= "7">
        </L>
        <L id= "16">
                <SEG id= "17" starts_in= "7" ends_in= "8">
        </L>
        <L id= "18">
                <SEG id= "19" starts_in= "8" ends_in= "9">
        </L>
<GTFDB>
```

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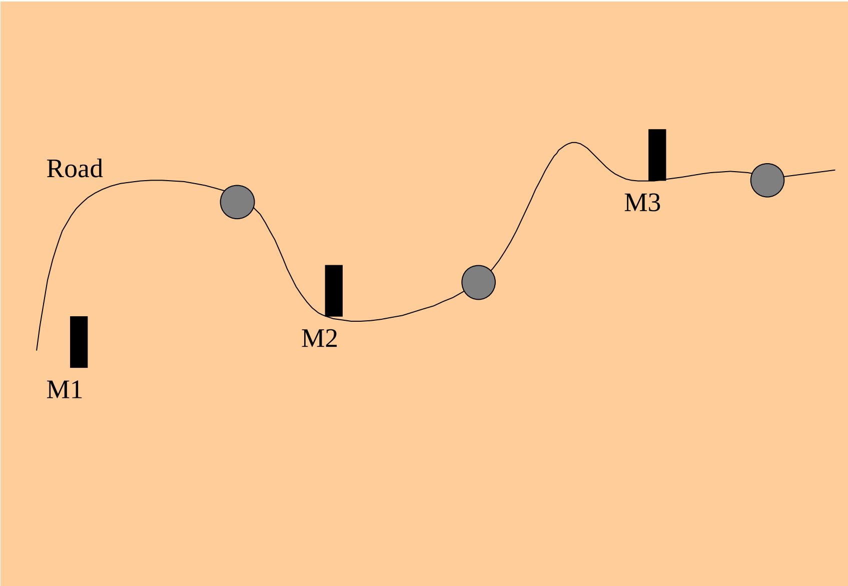
Example application 4: Dynamic Segmentation



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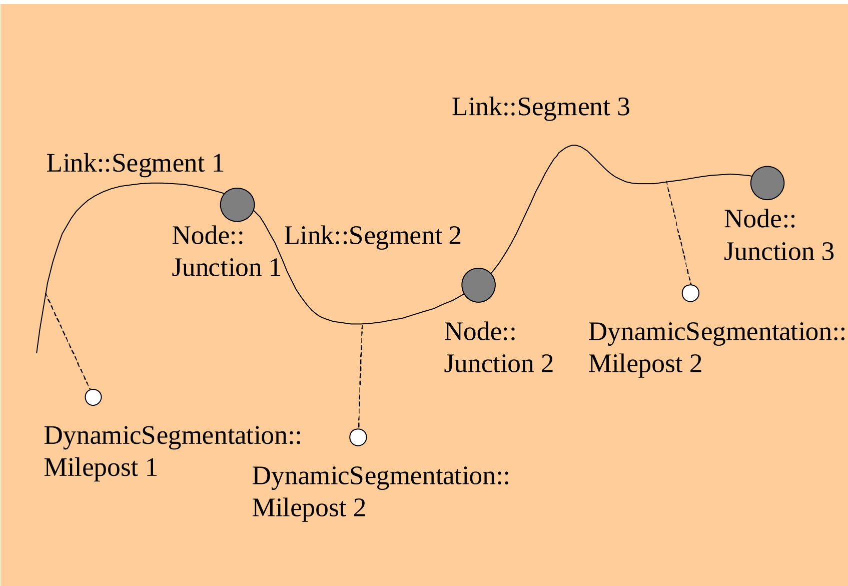
Example application 4: in GTF terms



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Example application 4: GTF objects

GTFDB	
id	0
name	Public Transport Example

Node	
id	1

Node	
id	2

Node	
id	3

Milepost	
id	4
distance_from_beginning	234
distance_from_ending	15

Milepost	
id	5
distance_from_beginning	126
distance_from_ending	124

Milepost	
id	6
distance_from_beginning	96
distance_from_ending	53

Segment	
id	8
starts_in	?
ends_in	1

Segment	
id	10
starts_in	1
ends_in	2

Segment	
id	12
starts_in	2
ends_in	3

* Note: associations are not depicted

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Example application 4: XML file

```
<!-- definition of the Public Transport example-->
<GTFDB id= "0" name= "Public Transport Example">
        <N id= "1">
        </N>
        <N id= "2">
        </N>
        <N id= "3">
        </N>
        <D>
          <MI id= "4" distance_from_beginning= "234" distance_from_ending= "15">
          <MI id= "5" distance_from_beginning= "126" distance_from_ending= "124">
          <MI id= "6" distance_from_beginning= "96" distance_from_ending= "53">
        </D>
        <L id= "7">
                <SEG id= "8" starts_in= "?" ends_in= "1">
        </L>
        <L id= "9">
                <SEG id= "10" starts_in= "1" ends_in= "2">
        </L>
        <L id= "11">
                <SEG id= "12" starts_in= "2" ends_in= "3">
        </L>
<GTFDB>
```

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DTU (Prof Nielsen): Transportation Object Platform TOP

RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

Otto Anker Nielsen (oan@ctt.dtu.dk)
Research Professor, Ph.D.
Centre for Traffic and Transport
Technical University of Denmark

Centre for Traffic and Transport (CTT), Technical University of Denmark (DTU)

RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

The Presentation

- The project
- Background
- Object oriented approaches
- The data model
- Elements of the Transport Object Platform
- Examples
- Utilising TOP in transit assignment procedures
- Advantages / summary

Centre for Traffic and Transport (CTT), Technical University of Denmark (DTU)

RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

The project

- Internally funded development project
- Developed in cooperation between WS Atkins, the Technical University of Denmark and ESRI
- Aim: Making it possible to handle complex, multi-modal transportation data in a GIS
- On top of that: Advanced analysis and modelling tools

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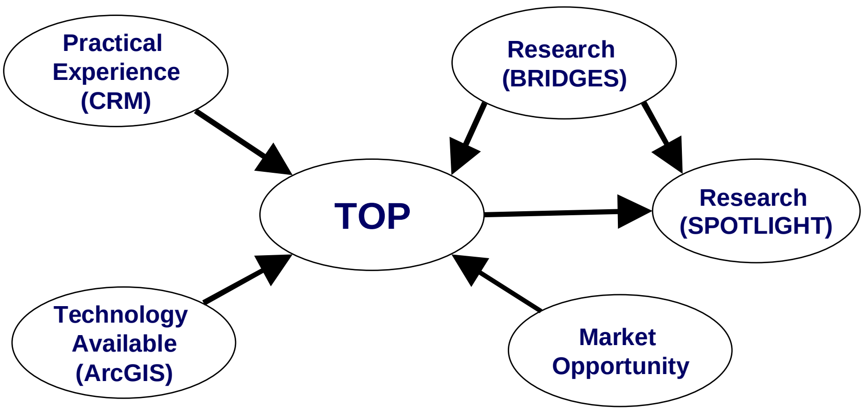
RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

Background



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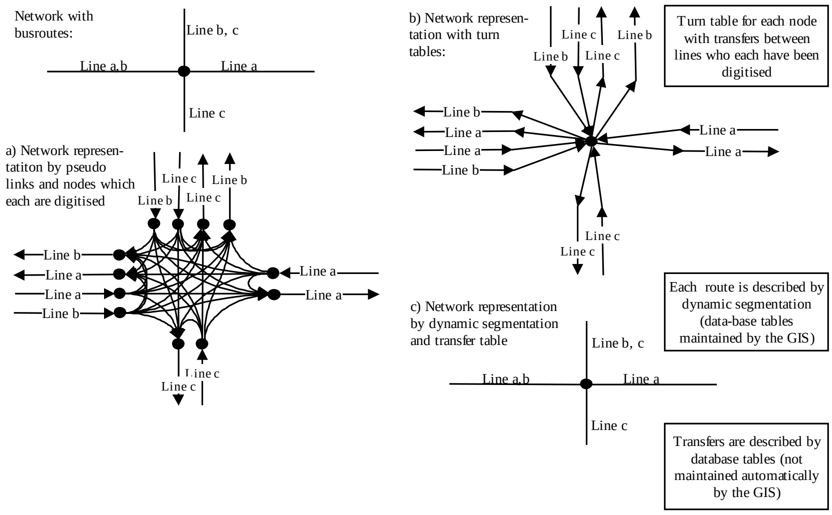
RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

Typical problems in prior GIS



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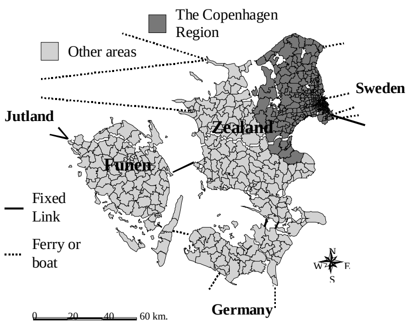
Background – East Denmark Model (CRM)

- A detailed traffic model covering half of Denmark



- Timetables (all runs with about 2,500 lines ~ 0.4 mio. stops, 30,000 stop groups and 4 mio. pseudo arcs)

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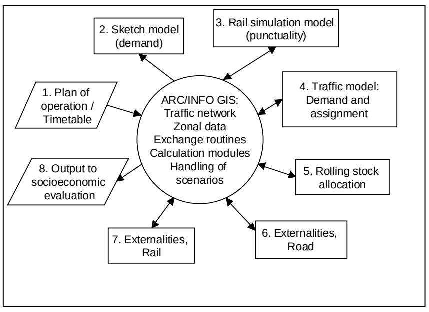
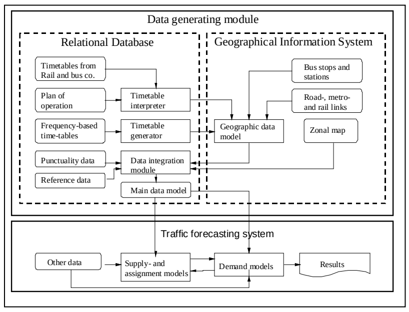
Background - CRM

- Complex dataflow, Difficult to maintain consistency
- Separate models used proprietary data formats





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Background - Technology

Newest generation of GIS is:

- Object Oriented
- Flexible - new and customisable data models, etc.
- Extensible & Programmable - embedded functionality
- Open - Standard DBMS, COM, VBA etc.
- Offers advanced features - tools, versioned editing etc.

It is now possible to create new topological objects, design new data models and embed functionality!

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Object oriented approaches (1)

Objects encapsulates:

- Properties
- Functionalities
- Events

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Object oriented approaches (2)

Objects can:

- Inherit properties and functionalities
- Be grouped together (within or between classes)
- Be related to each other (within or between classes)
- In ArcInfo they can also follow connectivity rules to each other

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The Transport Object Platform consists of

- Conceptual model
- Data model
- Programmed functionality in data objects
- Editing and Visualization tools
- Advanced modelling and analysis tools

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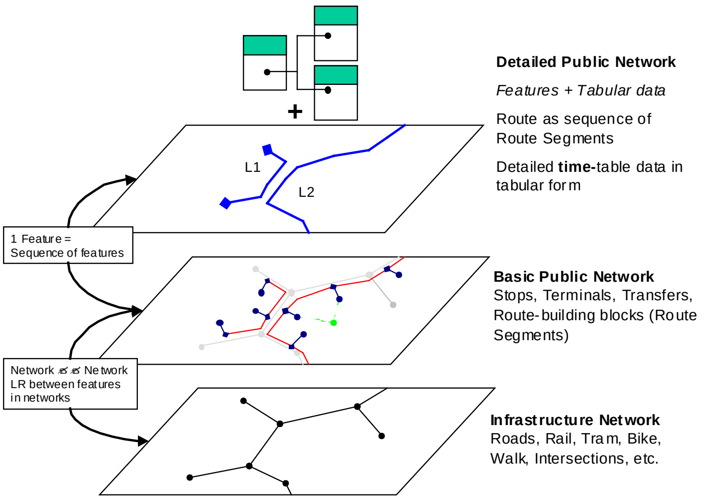
Data model (1)



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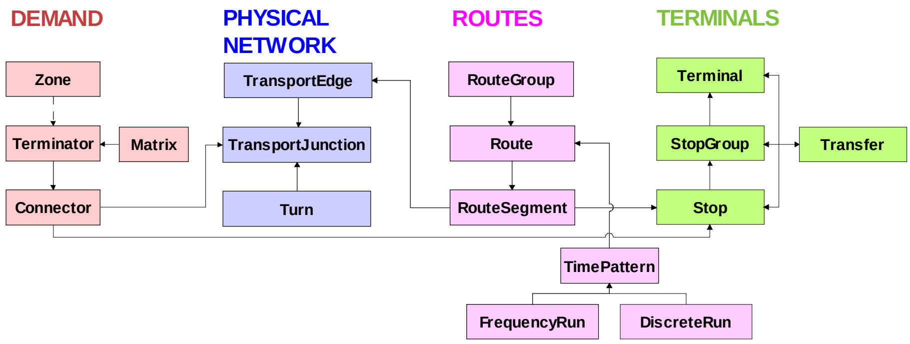
Data model (2)

TOP Conceptual Overview



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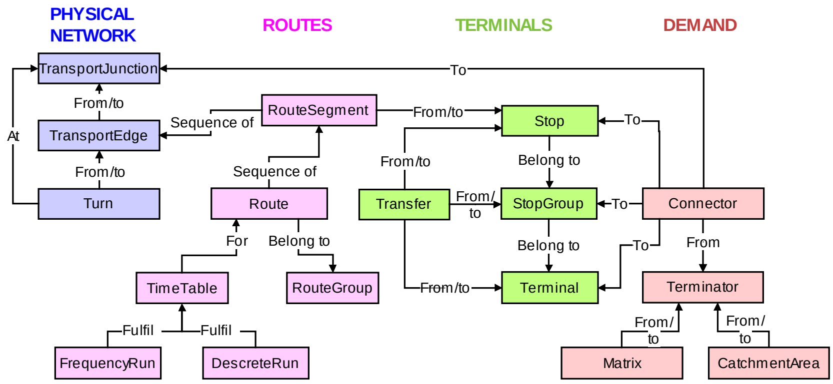
Data model (3)

TOP Conceptual Overview



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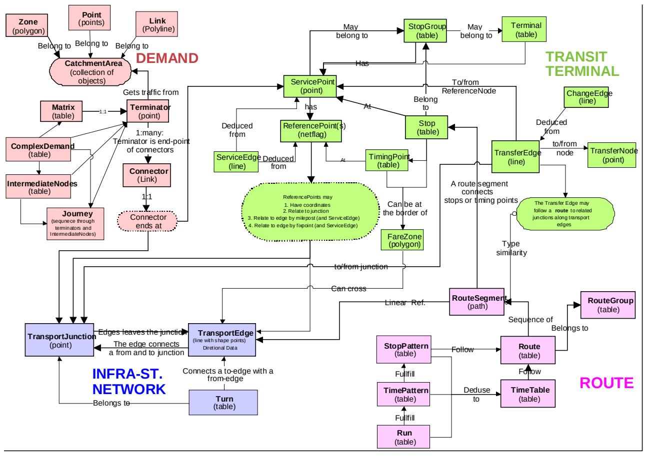
Data model (4)



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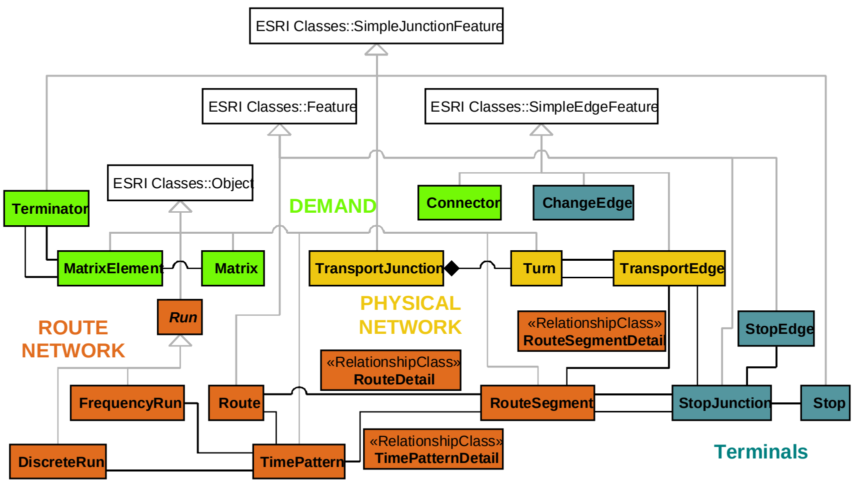
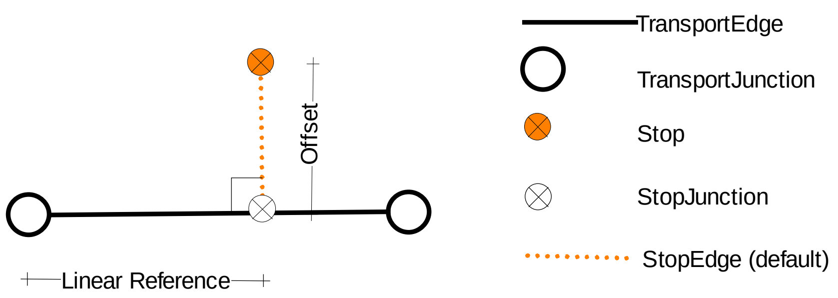
Data model (5)



RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

Stops



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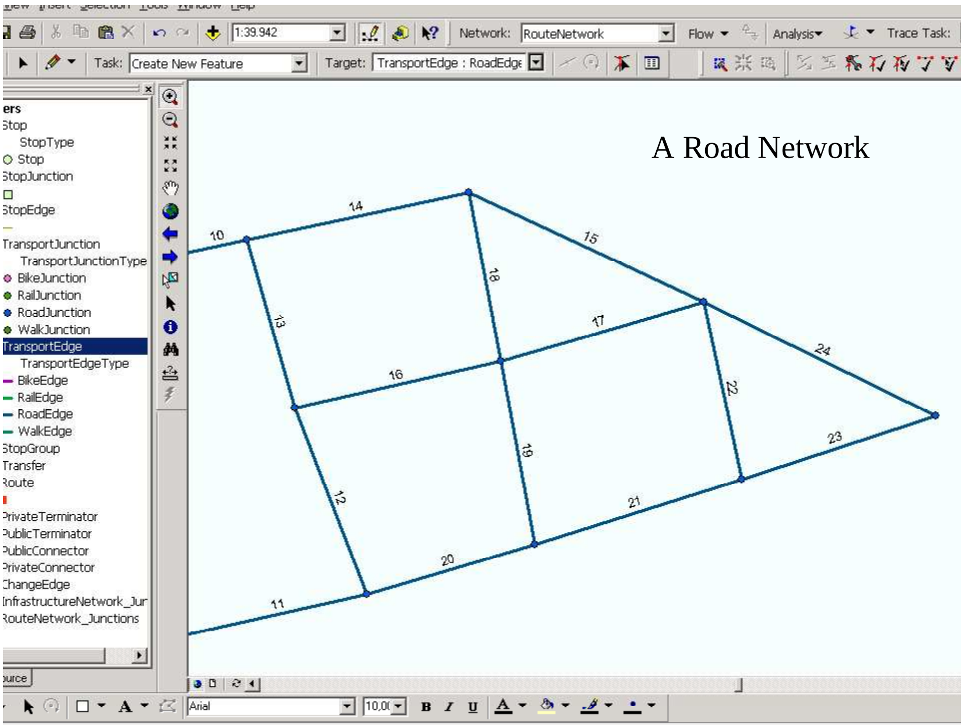
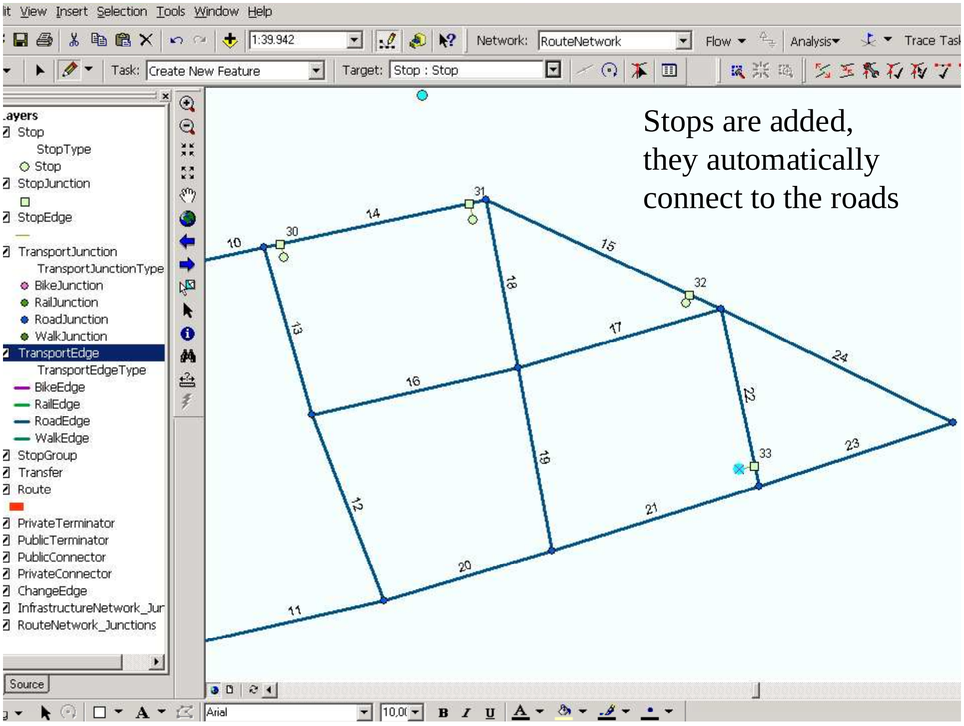
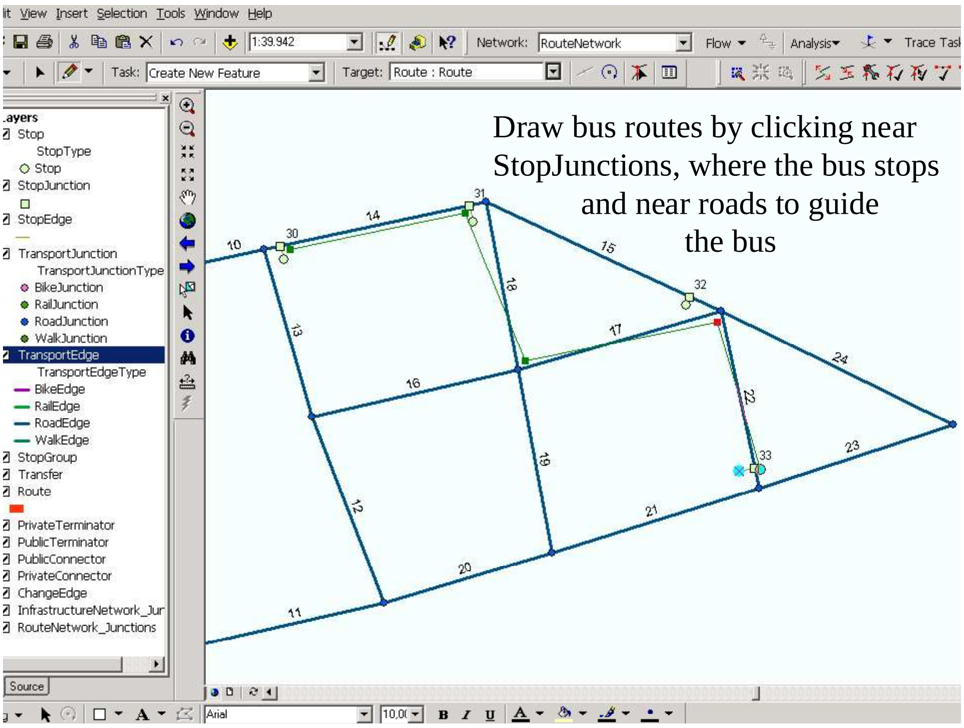
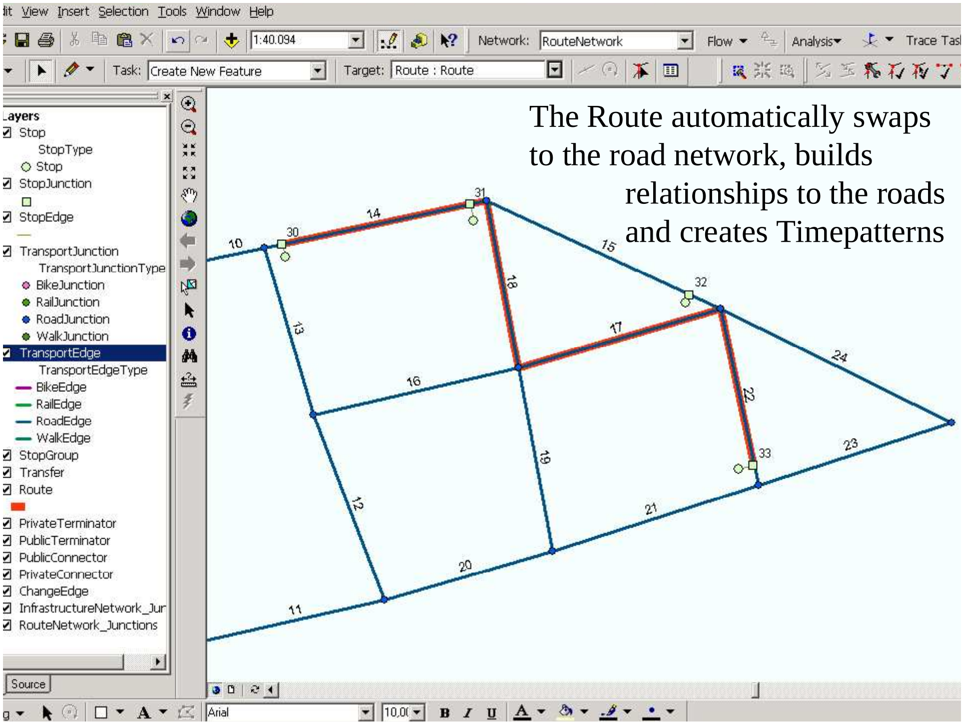
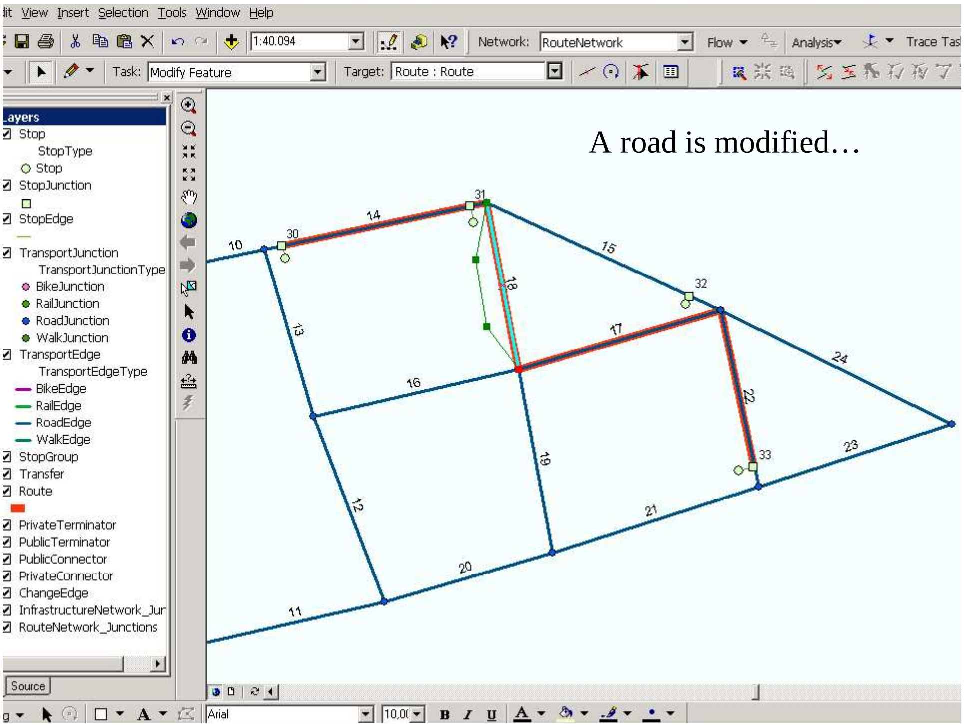
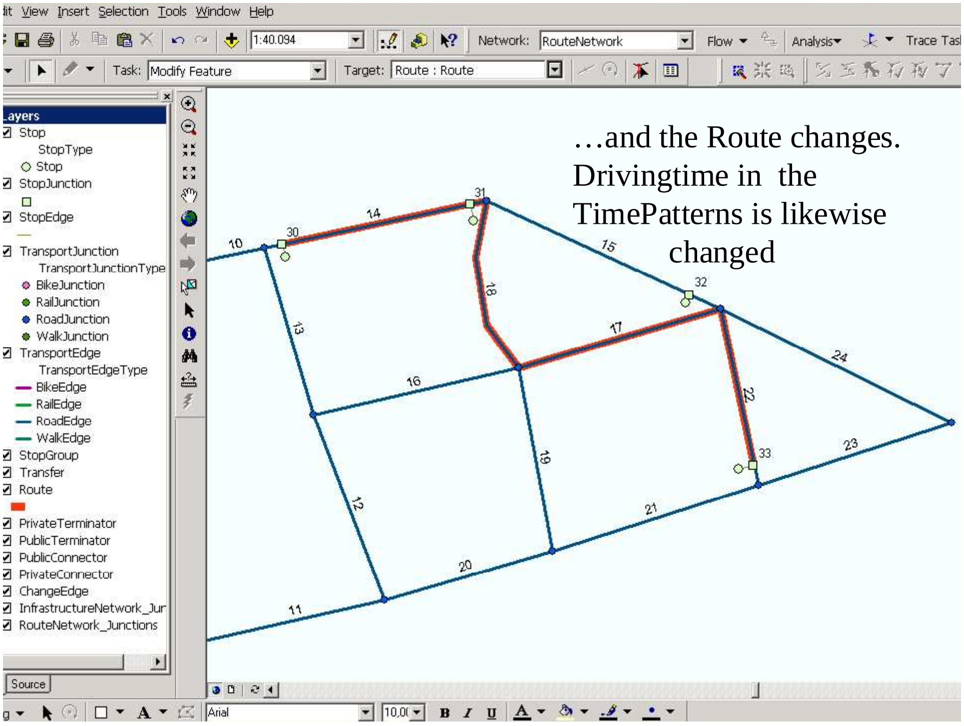


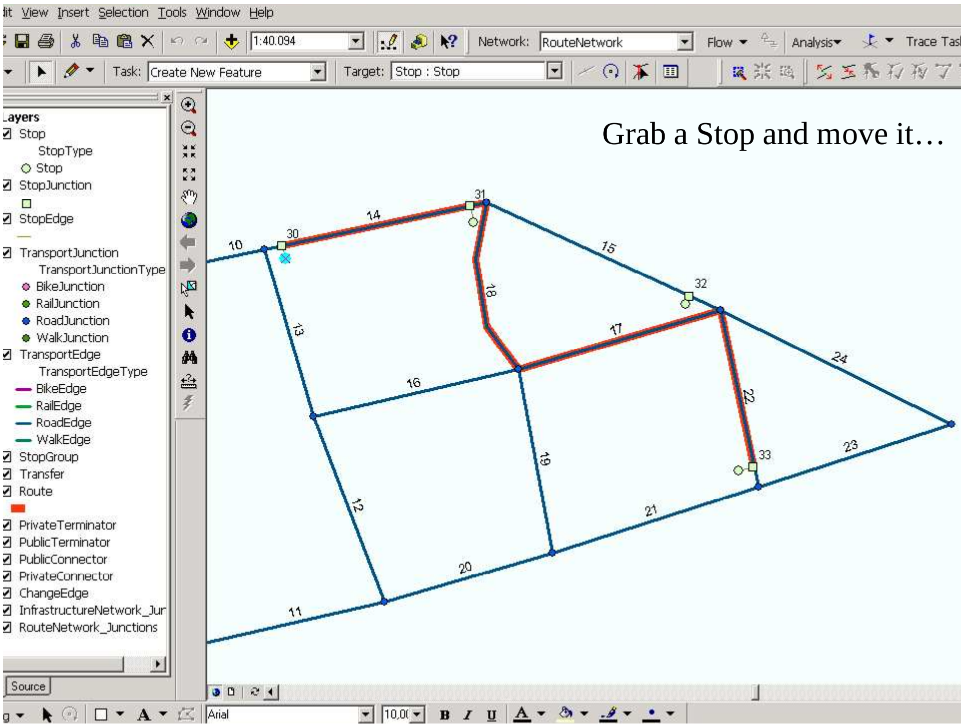

Stops are added,
they automatically
connect to the roads

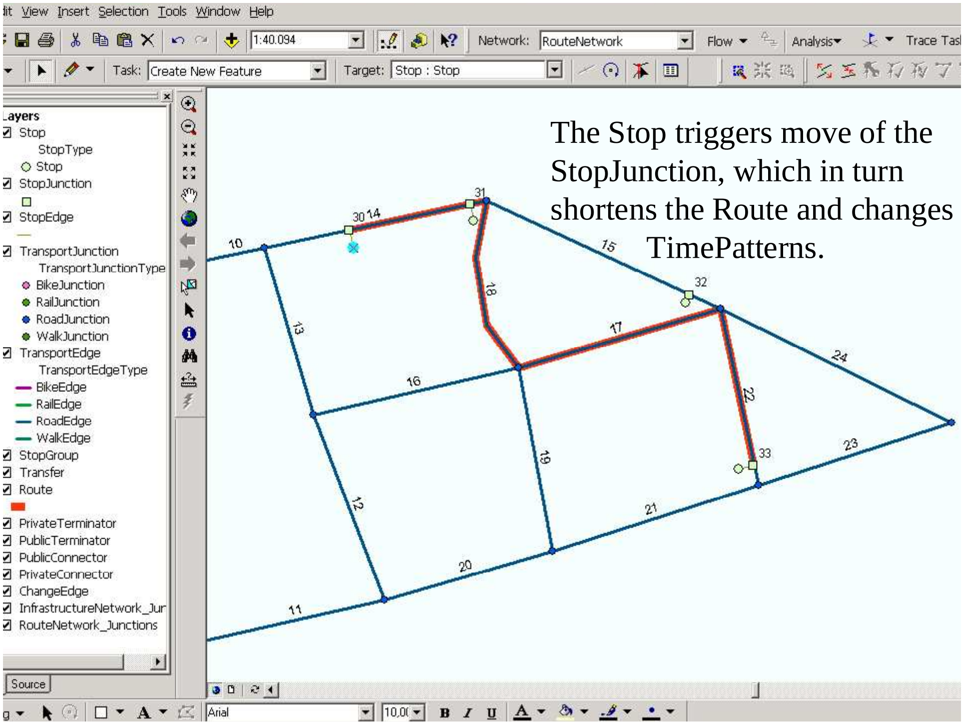

Draw bus routes by clicking near
StopJunctions, where the bus stops
and near roads to guide
the bus

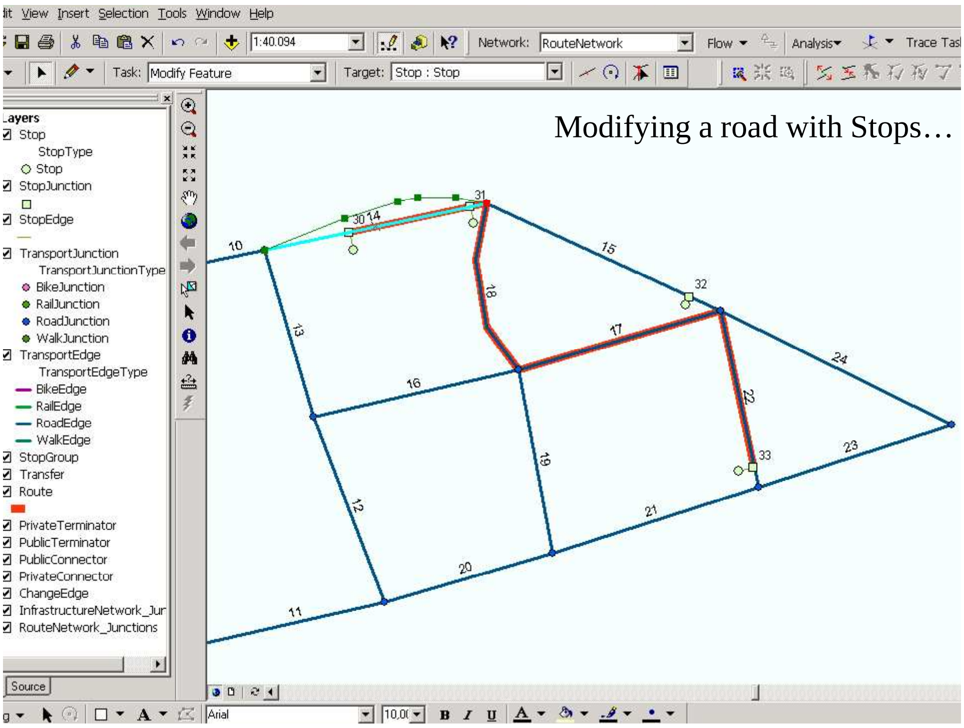

The Route automatically swaps to the road network, builds relationships to the roads and creates Timepatterns

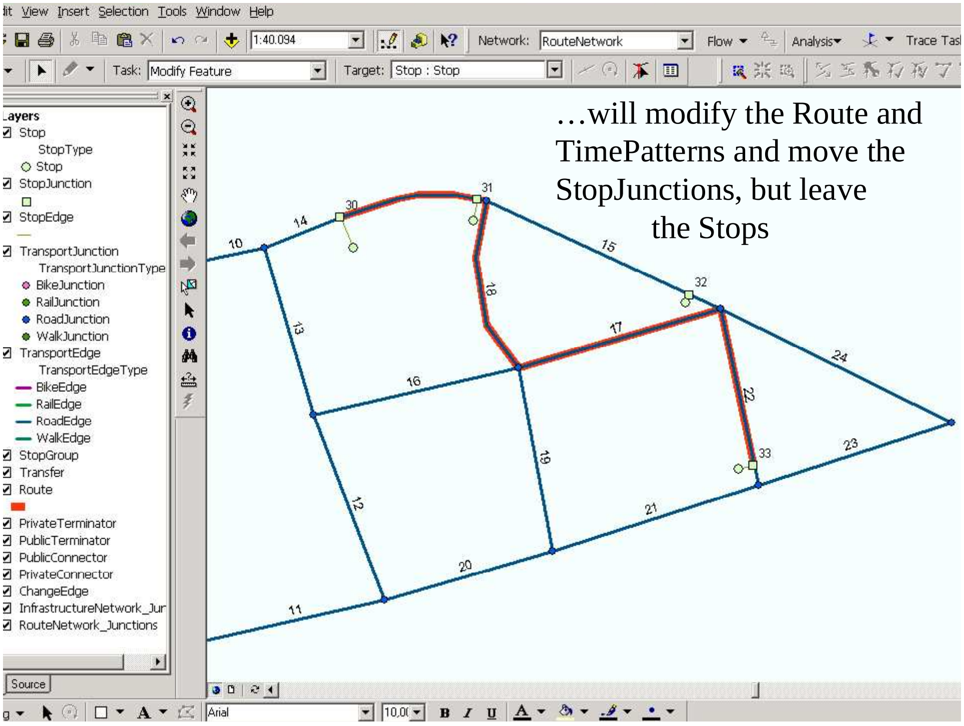

A road is modified…

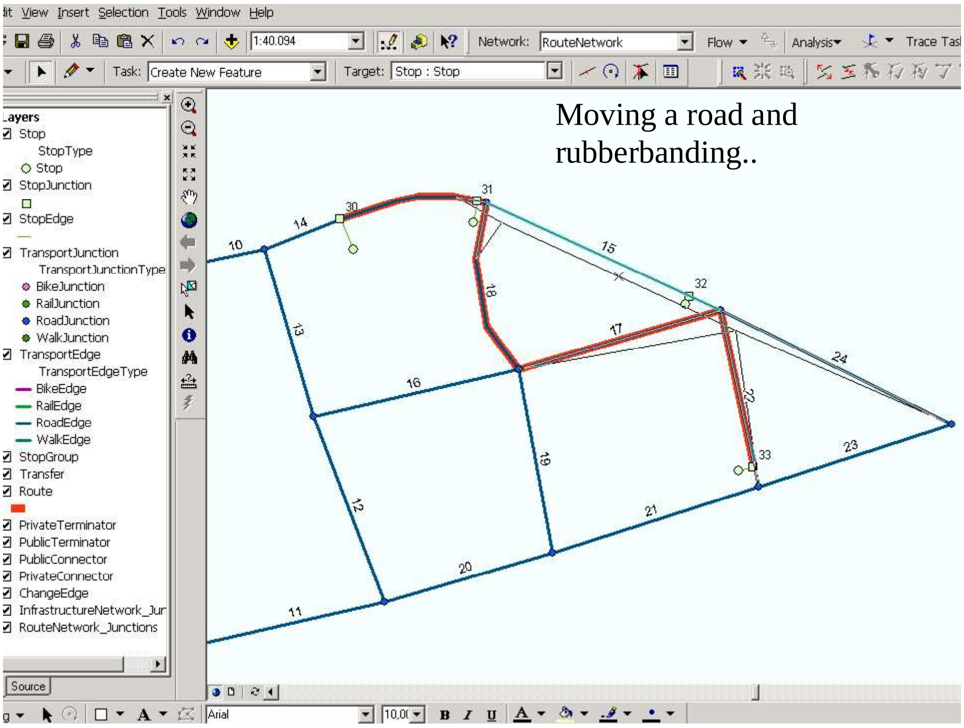

…and the Route changes.
Drivingtime in the
TimePatterns is likewise
changed

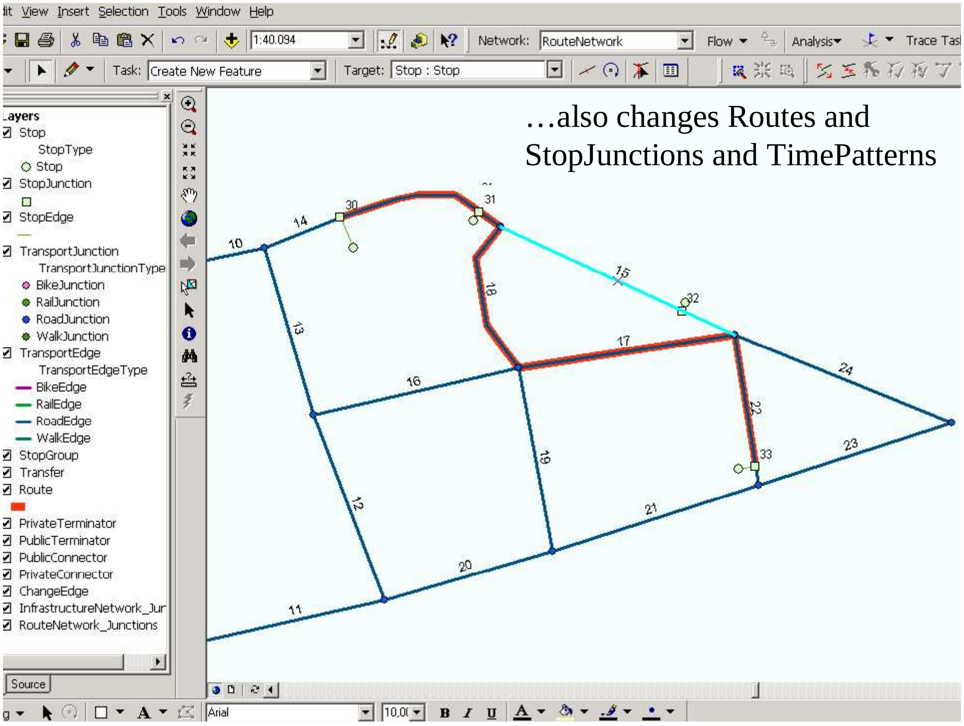

Grab a Stop and move it…

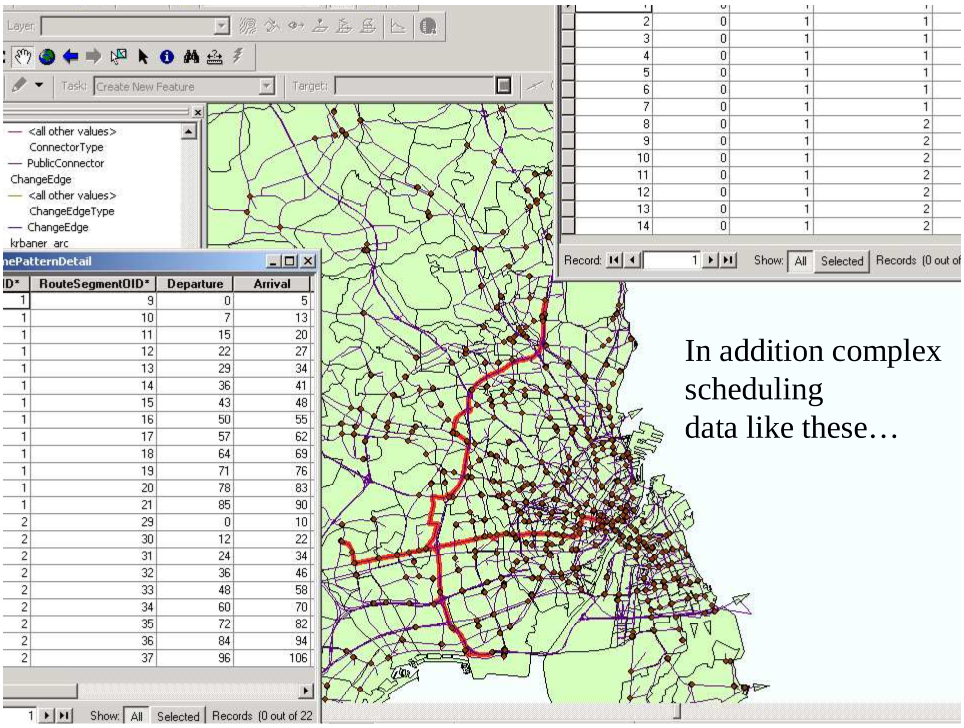

The Stop triggers move of the StopJunction, which in turn shortens the Route and changes TimePatterns.

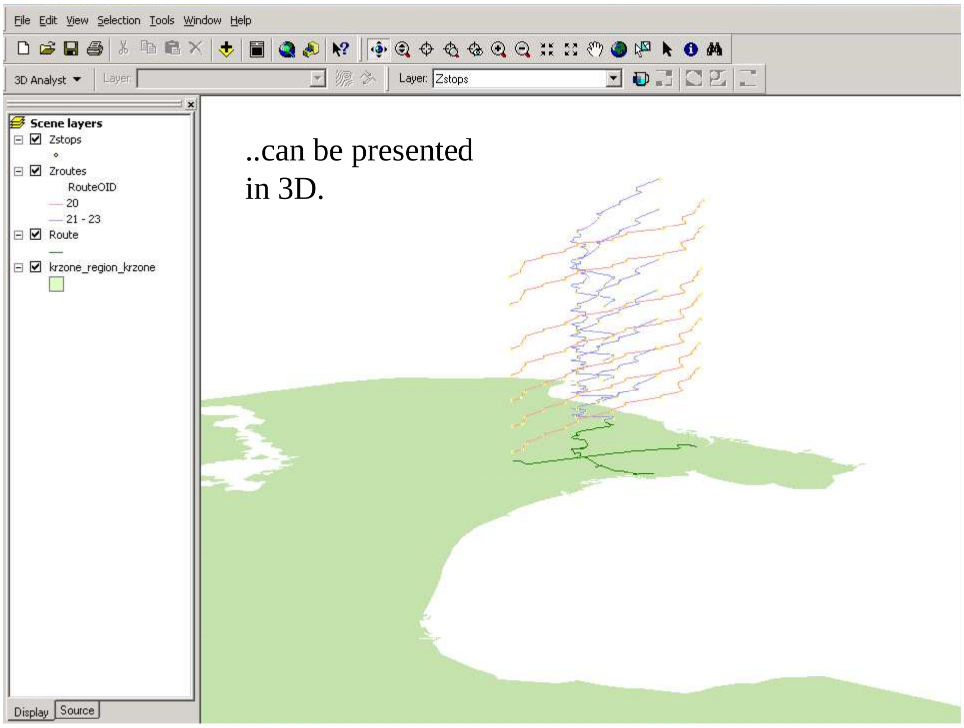

Modifying a road with Stops…


…will modify the Route and TimePatterns and move the StopJunctions, but leave the Stops


Moving a road and rubberbanding..


…also changes Routes and
StopJunctions and TimePatterns


In addition complex
scheduling
data like these…



RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

Utilising TOP in Public transport assignment models

Different conceptual levels of networks:

- Geographic network
- Organisational network
- Calculation network (logical network, not only a graph)

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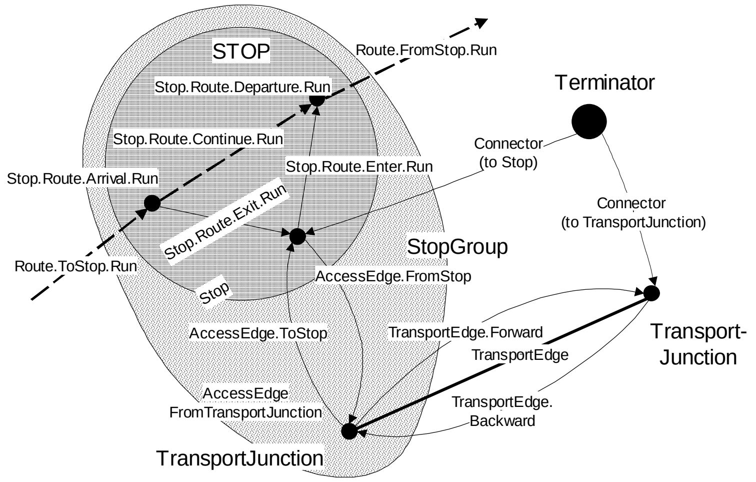
Multi-modal modelling – extracting the logical network from TOP



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Rule based assignment models

- The graph is built dynamically (graph pruning)
- Search algorithms utilise the hierarchical structure of the network
- Á priori knowledge and geographical information can be used in label correction methods
- Refer to paper at TRISTAN IV

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RULE-BASED OBJECT-ORIENTED MODELLING OF PUBLIC TRANSPORT SYSTEMS

Advantages and summary

- GIS Environment is easy to use & intuitive
- Open, Extensible & Programmable
- Handles multiple layers of data, maintains consistency
- By using consistent and detailed data, better and faster models can be implemented
- Cut data-handling efforts significantly
- Facilitate work with more detailed data

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2.5. DTU (Prof Nielsen): Comparison of GTF and TOP

spotlightsTN GTF

GTF Introduction: Problems and solution

Otto Anker Nielsen
Technical University of Denmark (DTU)
Centre for Traffic and Transport (CTT)
Email: oan@ctt.dtu.dk

12th September 2001 Cambridge CTT/MKmetric

Current situation and problems

Software and model issues

Models at EU-level require data from many sources, BUT:

- Software and databases are inhomogeneous and incompatible from each other
- Exchange of data is difficult due to differences in conceptual models, definitions, formats and implicitly given meta-data
- Software is not fully documented, transparent and open

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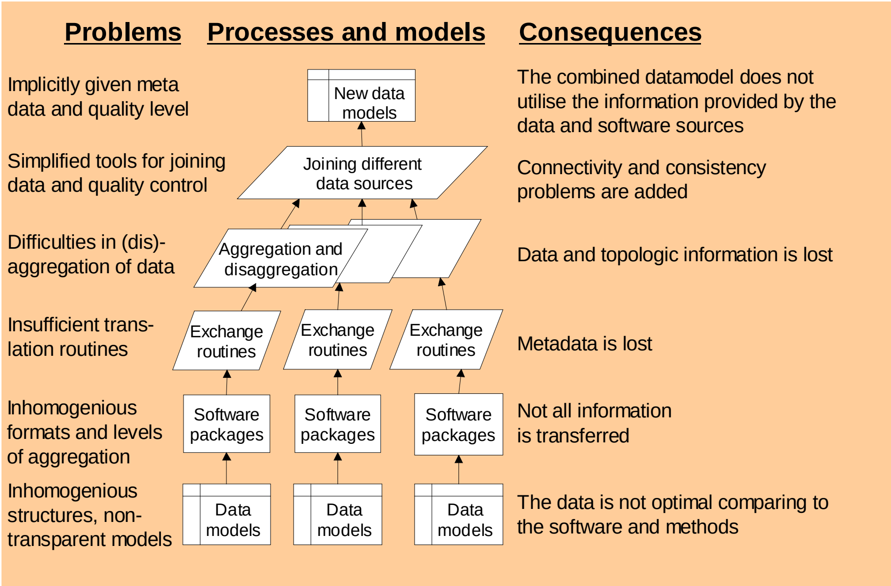
Possible problems integrating models and data sources



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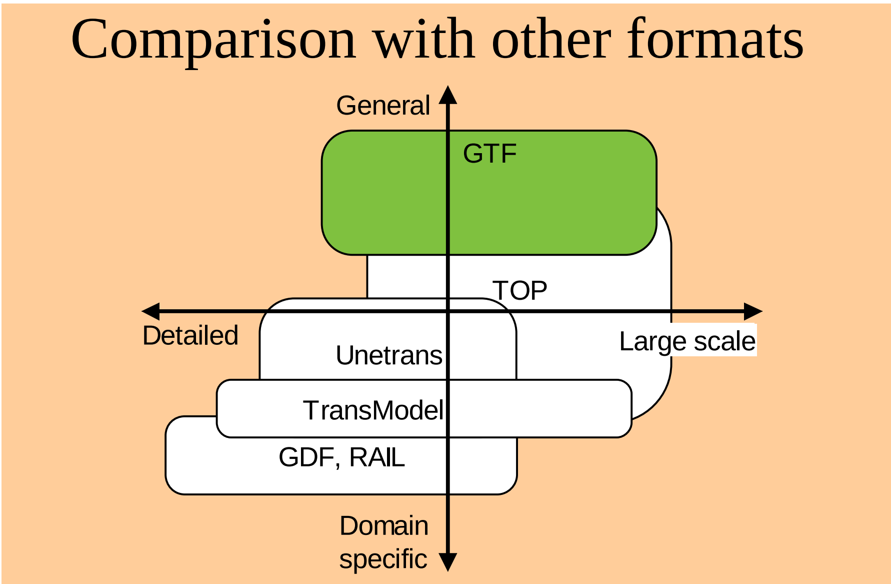
What is GTF ?



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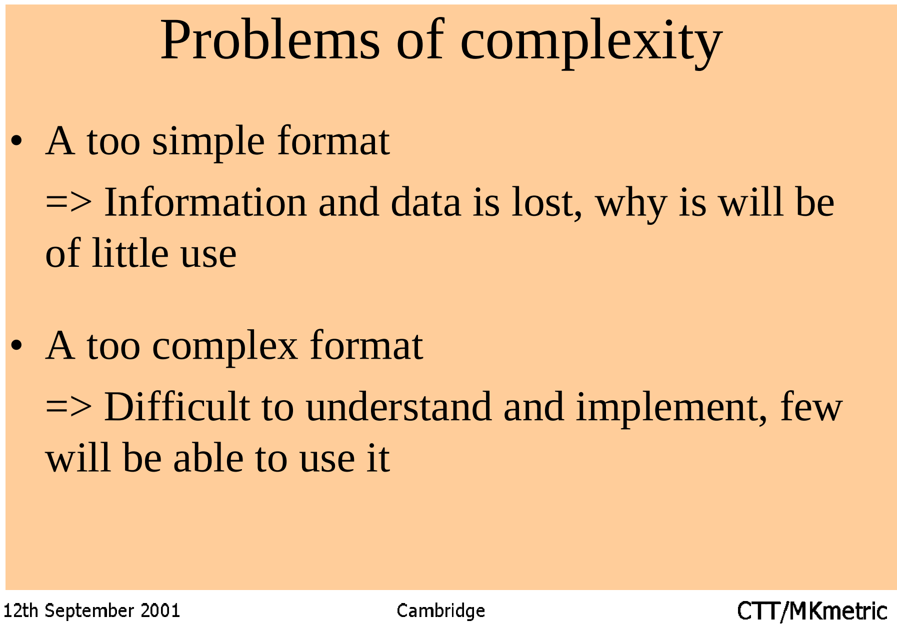
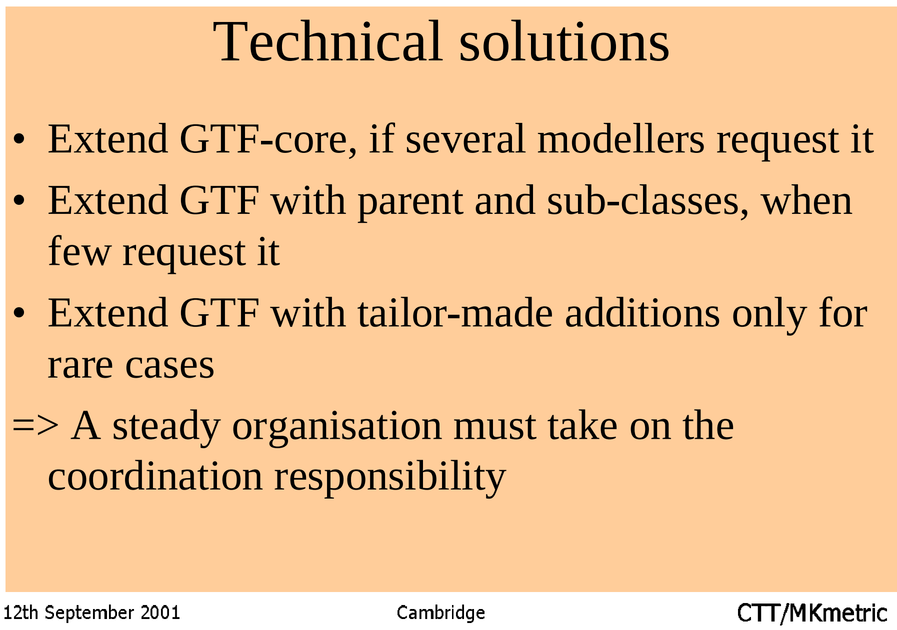
Response and discussion: Problems of complexity



Response and discussion: Solutions



Response and discussion: Organisational issues

Organisational issues

- Software providers may want to “trap” their customers
- Funding is low for modelling, especially for software development
- Data are non-public due to commercial, organisational or political reasons

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Common Understanding

Suggestions/ambitions (not yet agreed upon):

- The European Commission agrees to use GTF
- Provides funding to finalise GTF into
  - An operational format
  - Open source
  - GTF Reader/writer library of common functions
- Provides training workshops
- Modellers implement GTF and import-export filters to their software
- EC submit GTF to a world wide standards board
- EC will keep the GTF web discussion forum or the GTF mailing list open and permanent

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Possible benefits and the road ahead

Possible benefits

- Enables use of existing data and models in new modelling projects
- Makes it possible to compare different models' results
- Synergy by transferring knowledge between systems
- Data(bases) gain in quality, since data providers get a larger market
- Users can request combination of models with different scopes

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MCRIT (Esquius): ATM Planning Support System: ATMax

Extension of GTF-NIS Data Model to cover vehicle operations: implementation of the transport data model of the ATM

Carme Fabregas, ATM
Andreu Esquius, Meritxell Font, Mcrit

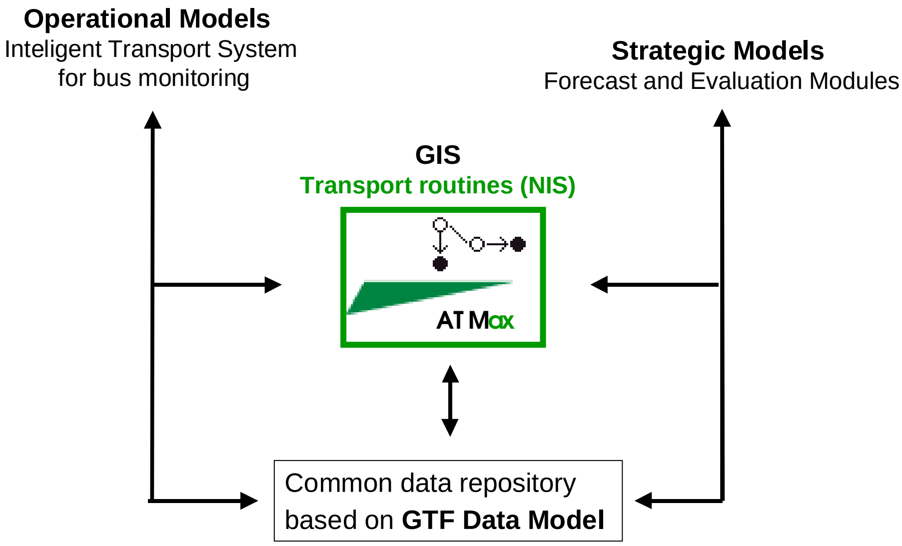
ATM Planning Support System

AT Max is an information and network analysis system developed by Mcrit for the **Metropolitan Transport Authority (ATM)**

AT Max is a tool focused in giving answers to most of the Metropolitan Transport Authority functions, which are:

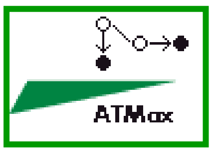
- **Planning public transport infrastructures**. Infrastructure Strategic Plan (ISP) 2001-2010.
- **Coordination of the services** offered by the operators. Public Transport Services Plan.
- Implementing a **Fare rates policy.**
- Executing Infrastructure projects.
- Reaching agreements between public institutions to **finance the Public Transport System**.

ATM Planning Support System



ATMax is part of the Transport Planning Support System of the Metropolitan Transport Authority of Barcelona.

ATM Planning Support System

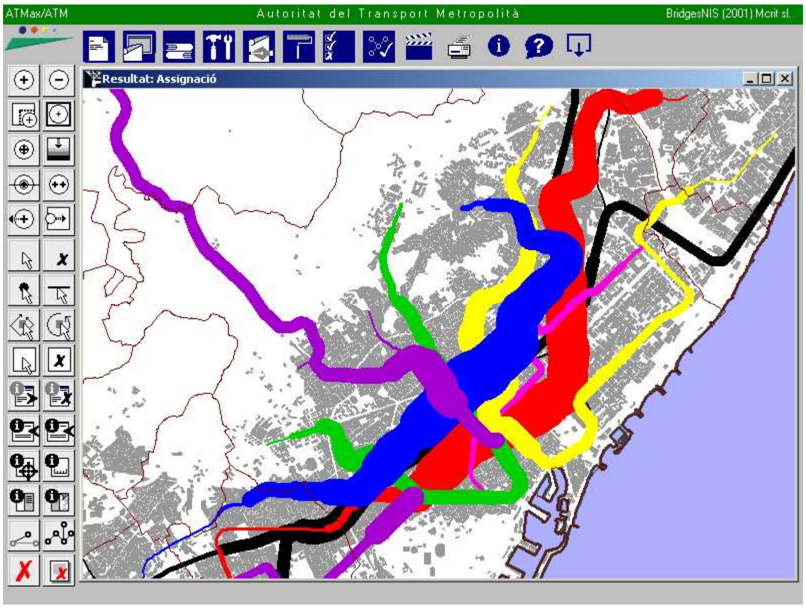


ATMax contains GIS and Database management modules adapted to transport, as well as specialised routines for transport anlysis (traffic assignment, spatial endowment, schedulling).

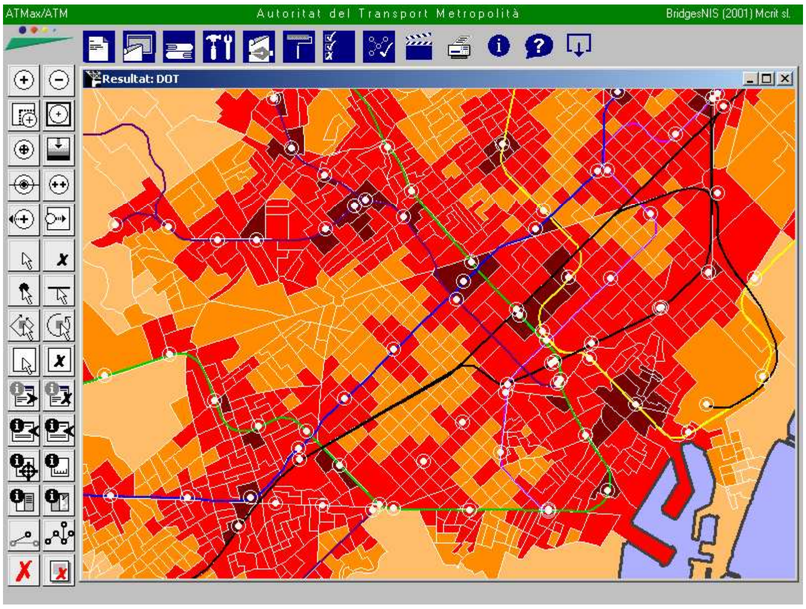
It is able to handle advanced transport data models usefull for both transport strategic and operational planning, **which have been defined based on the GTF standard.**

ATMax is based on **BridgesNIS software**, developed by Mcrit in the “Bridges” research (EU 4th FP)

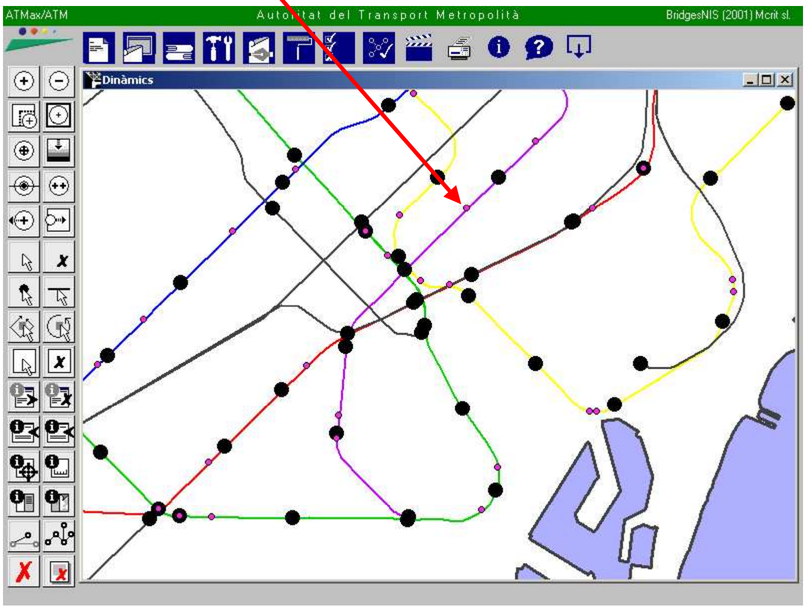
Traffic assignement to both Private and Public Transport Network



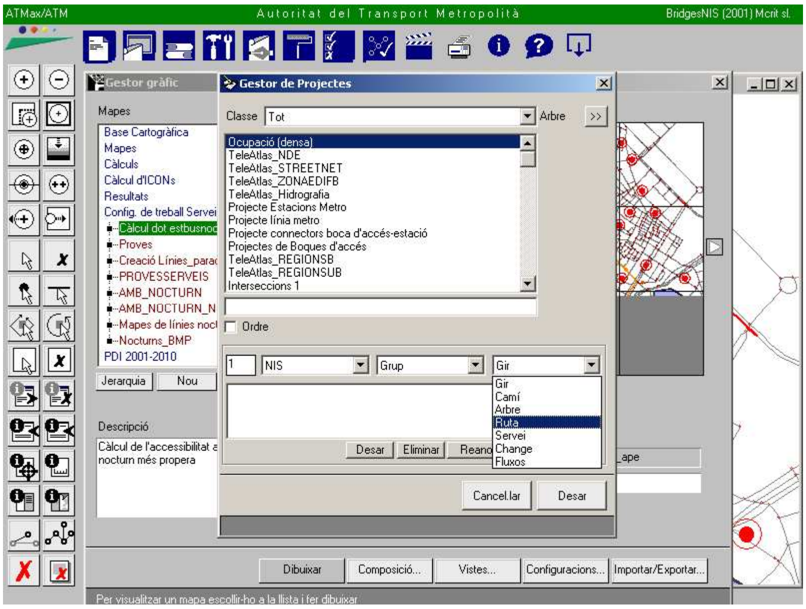
Spatial endowment: Hinterland of Public Transport Stops



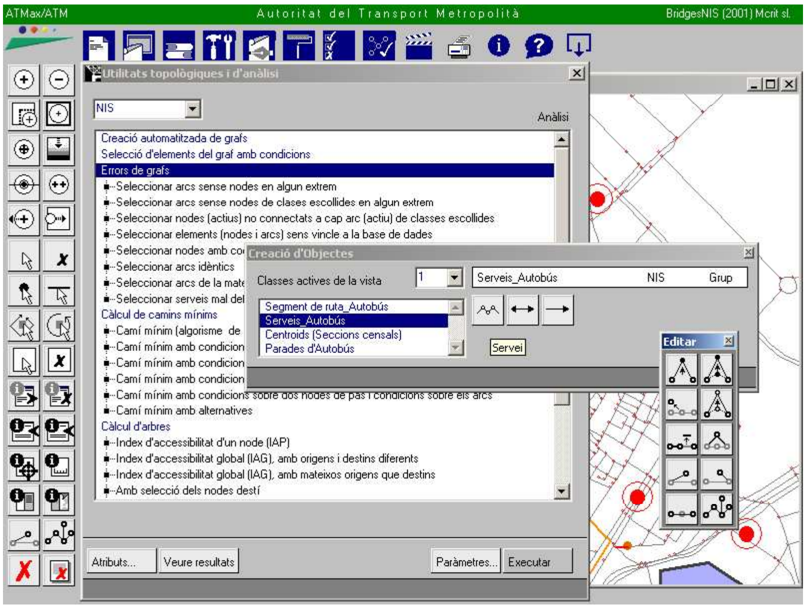
Dynamic analysis: Vehicles following schedules on simulated time



NIS database manager: (CAD,DBS,GIS,NIS), (node,link,group), (GTF entities)



NIS database graphic edition, quality checking and analysis)



Data Model

ATMax Data Model (GTF-NIS) uses the following entities categories:

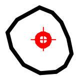
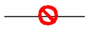
__**CAD** Entities__: Only geographic information attached. No database. No topological relationships with other entities. (i.g., reference Protected Areas)

__**GIS** Entities__: Geographic Information Attached. Database tables attached. No topological relationships with other entities. May have only geographic relationships with other entities. (i.g administrative boundaries)

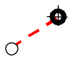
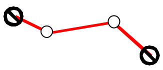
__**NIS** Entities__: Geographic Information Attached. Database tables attached. Have topological relationships with other entities. (A graph of Transport Network is made up of NIS entities).

__**DBS** Entities__: Database tables with no geographic information attached.

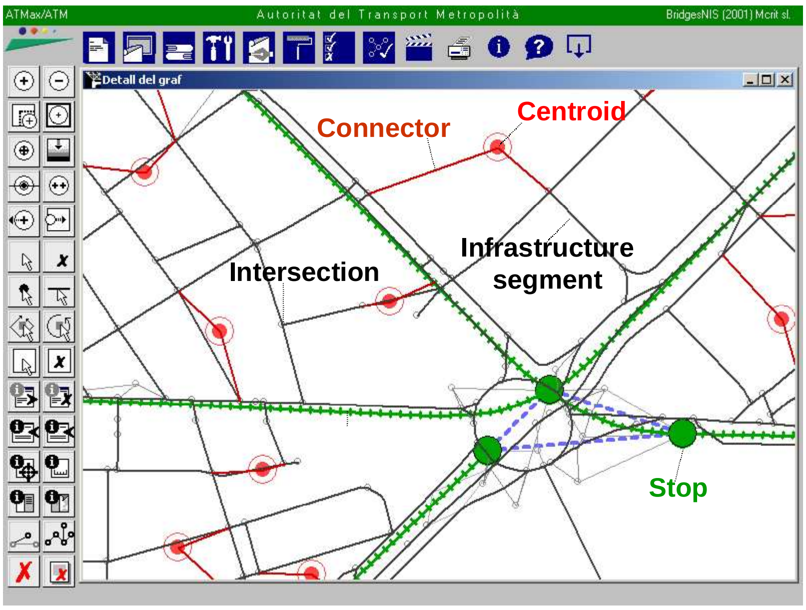
NIS/Node Entities used in Transport Planning Data Model

	**Intersection**	Node placed as default at the extremes of a link if not any other more complex subtopology is available (a centroid or a stop, for example)
	**Centroid**	Node representing a zone
	**Stop**	Railway, metro or tramway station, or Bus Stop.

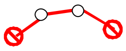
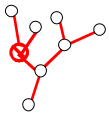
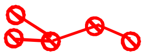
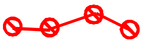
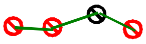
NIS/Link Entities used in Transport Planning Data Model

	**Connector**	Virtual Link representing, for instance, the connection between a centroid and the Transport network
	Infrastructure segment	Links representing the real infrastructure network: streets, roads, railway lines, Pedestrian Transfer Links between Stops
	**Route segment**	Link beetween two consecutive stops of a public Transport Route. It is formed by a continuous group of infrastructure segments (or parts of them).

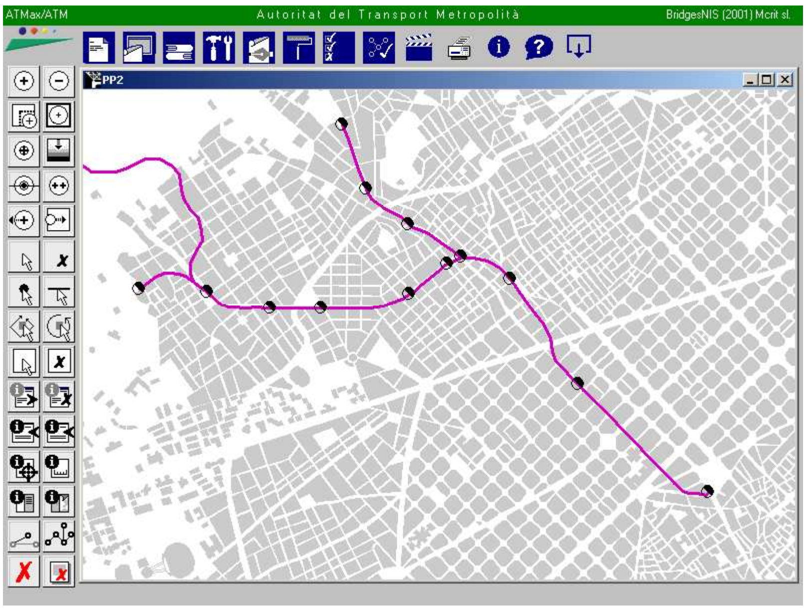
Graph detail



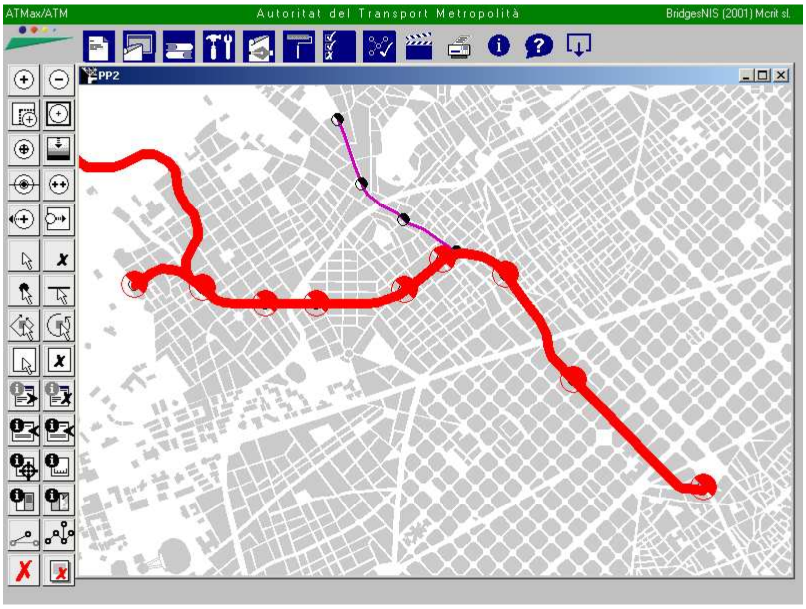
NIS/Group Entities used in Transport Planning Data Model

	**Turn**	Entity made up of two consecutive links and its common node. It has an impedance associated.
	**Corridor**	Continuous set of infrastructure segments
	**Tree**	Set of Infrastructure segments representing a set of paths from a common origin node to several destination nodes.
	**Flow**	Entity made up of two nodes and a straight virtual arc, representing an O/D pair.
	**Line**	Entity formed by a set of route segments. Represents a Transport business Operating Unity, for example.
	**Route**	Entity formed by a set of route segments and all the stops at the extrems of the route segments. Several Routes belong to a line
	**Service**	A Service contains a subset of route segments and stops. A service belongs to a route. The entity Service does not contain the direction. A service is open to be used following the two directions.
	**Terminal**	Group of Stops

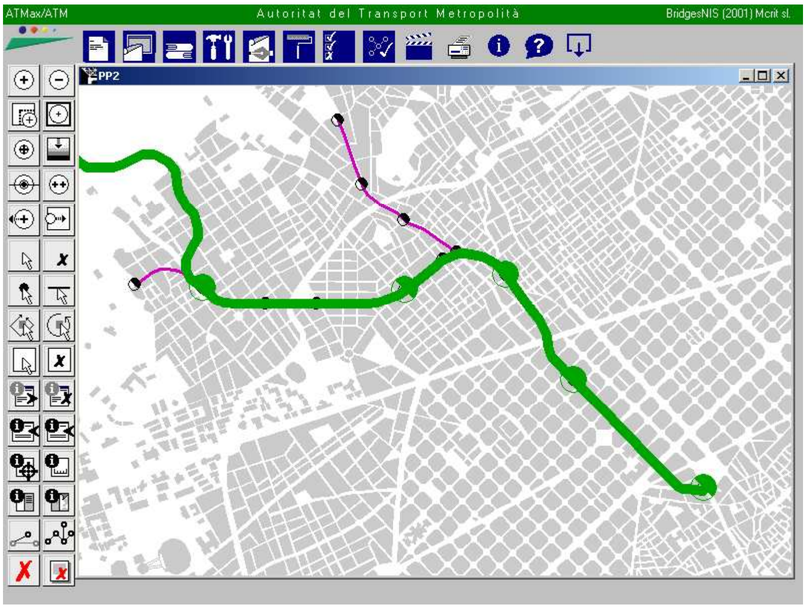
Public Transport: Rail Infrastructure segments and Stops



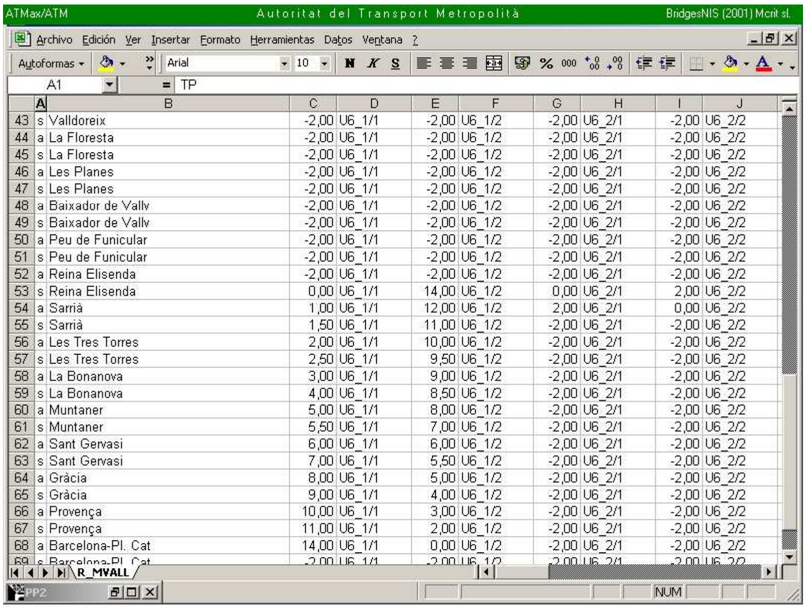
Public Transport Route



Public Transport Service

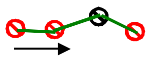


Route table: Schedule of all services belonging to a route



	A	B	C	D	E	F	G	H	I	J
43	s	Valldoreix	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
44	a	La Floresta	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
45	s	La Floresta	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
46	a	Les Planes	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
47	s	Les Planes	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
48	a	Baixador de Vallv	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
49	s	Baixador de Vallv	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
50	a	Peu de Funicular	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
51	s	Peu de Funicular	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
52	a	Reina Elisenda	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
53	s	Reina Elisenda	0,00	U6_1/1	14,00	U6_1/2	0,00	U6_2/1	2,00	U6_2/2
54	a	Sarrià	1,00	U6_1/1	12,00	U6_1/2	2,00	U6_2/1	0,00	U6_2/2
55	s	Sarrià	1,50	U6_1/1	11,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
56	a	Les Tres Torres	2,00	U6_1/1	10,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
57	s	Les Tres Torres	2,50	U6_1/1	9,50	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
58	a	La Bonanova	3,00	U6_1/1	9,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
59	s	La Bonanova	4,00	U6_1/1	8,50	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
60	a	Muntaner	5,00	U6_1/1	8,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
61	s	Muntaner	5,50	U6_1/1	7,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
62	a	Sant Gervasi	6,00	U6_1/1	6,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
63	s	Sant Gervasi	7,00	U6_1/1	5,50	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
64	a	Gràcia	8,00	U6_1/1	5,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
65	s	Gràcia	9,00	U6_1/1	4,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
66	a	Provença	10,00	U6_1/1	3,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
67	s	Provença	11,00	U6_1/1	2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
68	a	Barcelona-Pl. Cat	14,00	U6_1/1	0,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
69	s	Barcelona-Pl. Cat	-2,00	U6_1/1	-2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2

Bridging AT Max
to SAE (Operation Management Support System)



"Trajecte"

A new entity has been defined to make easier the bridge between the Planning Support System and the Operation Monitoring Support System. This entity is equivalent to a service but incorporates the direction. While a service is open to be used in both directons, this new entity incorporates as an attribute the direction.

Other entities needed in Operation Management Data Model

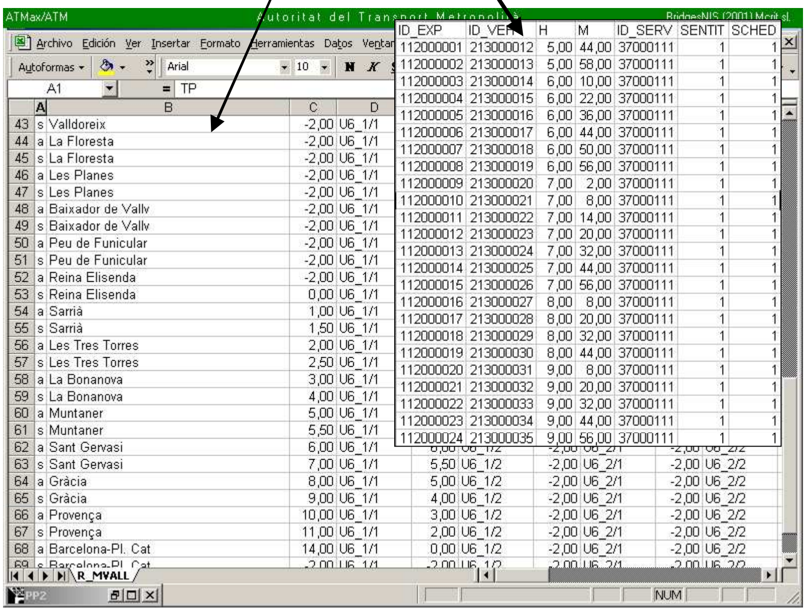
Vehicle Node with variable geometry depending on time. Concerning to Public Transport, a vehicle belongs to a **Fleet** and the Fleet belongs to an **Operator.**

Fleet Database entity. Set of vehicles belonging to an Operator

Operator Database entity.

Schedule Table of events. Vehicles making transport services, begining at a certain time.

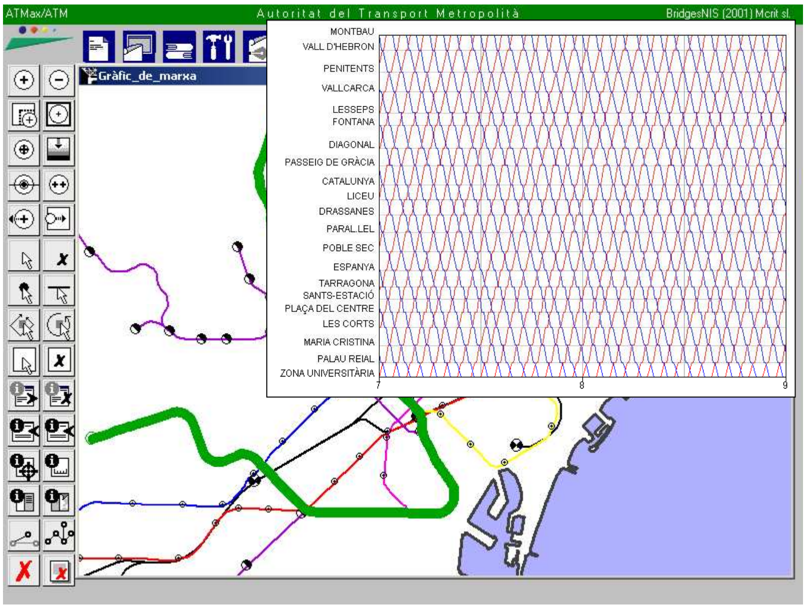
Schedulling: Route table and Expedition table



	A	B	C	D						
43	s	Valldoreix	-2,00	U6_1/1						
44	a	La Floresta	-2,00	U6_1/1						
45	s	La Floresta	-2,00	U6_1/1						
46	a	Les Planes	-2,00	U6_1/1						
47	s	Les Planes	-2,00	U6_1/1						
48	a	Baixador de Vallv	-2,00	U6_1/1						
49	s	Baixador de Vallv	-2,00	U6_1/1						
50	a	Peu de Funicular	-2,00	U6_1/1						
51	s	Peu de Funicular	-2,00	U6_1/1						
52	a	Reina Elisenda	-2,00	U6_1/1						
53	s	Reina Elisenda	0,00	U6_1/1						
54	a	Sarrià	1,00	U6_1/1						
55	s	Sarrià	1,50	U6_1/1						
56	a	Les Tres Torres	2,00	U6_1/1						
57	s	Les Tres Torres	2,50	U6_1/1						
58	a	La Bonanova	3,00	U6_1/1						
59	s	La Bonanova	4,00	U6_1/1						
60	a	Muntaner	5,00	U6_1/1						
61	s	Muntaner	5,50	U6_1/1						
62	a	Sant Gervasi	6,00	U6_1/1						
63	s	Sant Gervasi	7,00	U6_1/1	5,50	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
64	a	Gràcia	8,00	U6_1/1	5,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
65	s	Gràcia	9,00	U6_1/1	4,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
66	a	Provença	10,00	U6_1/1	3,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
67	s	Provença	11,00	U6_1/1	2,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2
68	a	Barcelona-Pl. Cat	14,00	U6_1/1	0,00	U6_1/2	-2,00	U6_2/1	-2,00	U6_2/2

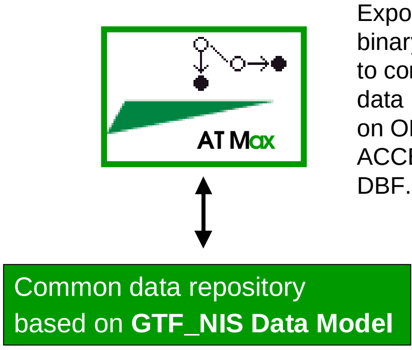
ID_EXP	ID_VER	H	M	ID_SERV	SENTIT	SCHED
112000001	213000012	5,00	44,00	37000111	1	1
112000002	213000013	5,00	58,00	37000111	1	1
112000003	213000014	6,00	10,00	37000111	1	1
112000004	213000015	6,00	22,00	37000111	1	1
112000005	213000016	6,00	36,00	37000111	1	1
112000006	213000017	6,00	44,00	37000111	1	1
112000007	213000018	6,00	50,00	37000111	1	1
112000008	213000019	6,00	56,00	37000111	1	1
112000009	213000020	7,00	2,00	37000111	1	1
112000010	213000021	7,00	8,00	37000111	1	1
112000011	213000022	7,00	14,00	37000111	1	1
112000012	213000023	7,00	20,00	37000111	1	1
112000013	213000024	7,00	32,00	37000111	1	1
112000014	213000025	7,00	44,00	37000111	1	1
112000015	213000026	7,00	56,00	37000111	1	1
112000016	213000027	8,00	8,00	37000111	1	1
112000017	213000028	8,00	20,00	37000111	1	1
112000018	213000029	8,00	32,00	37000111	1	1
112000019	213000030	8,00	44,00	37000111	1	1
112000020	213000031	9,00	8,00	37000111	1	1
112000021	213000032	9,00	20,00	37000111	1	1
112000022	213000033	9,00	32,00	37000111	1	1
112000023	213000034	9,00	44,00	37000111	1	1
112000024	213000035	9,00	56,00	37000111	1	1

Schedulling: Railway operation Graphic



ATMax database is originally stored in an internal binary format called MGS. The reason is to optimize the running time of transport algorithms. Nevertheless, an export function is available to translate this internal binary format into a public format DBF/ACCESS, that will be compatible with GTF format.

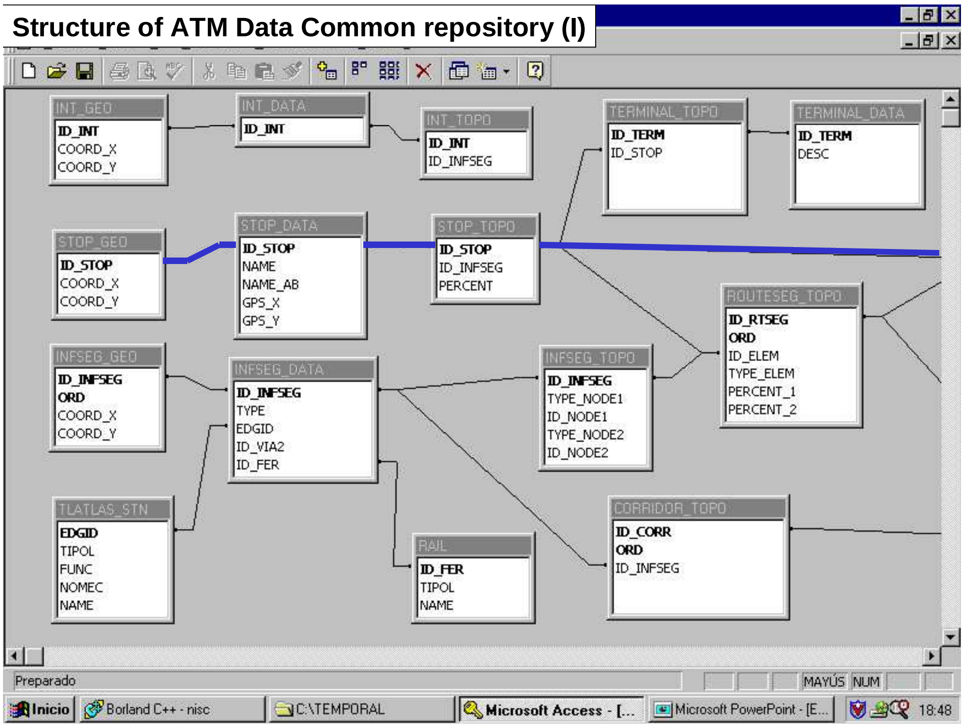
Export of the binary formats to common data repository on ORACLE, ACCESS, DBF...

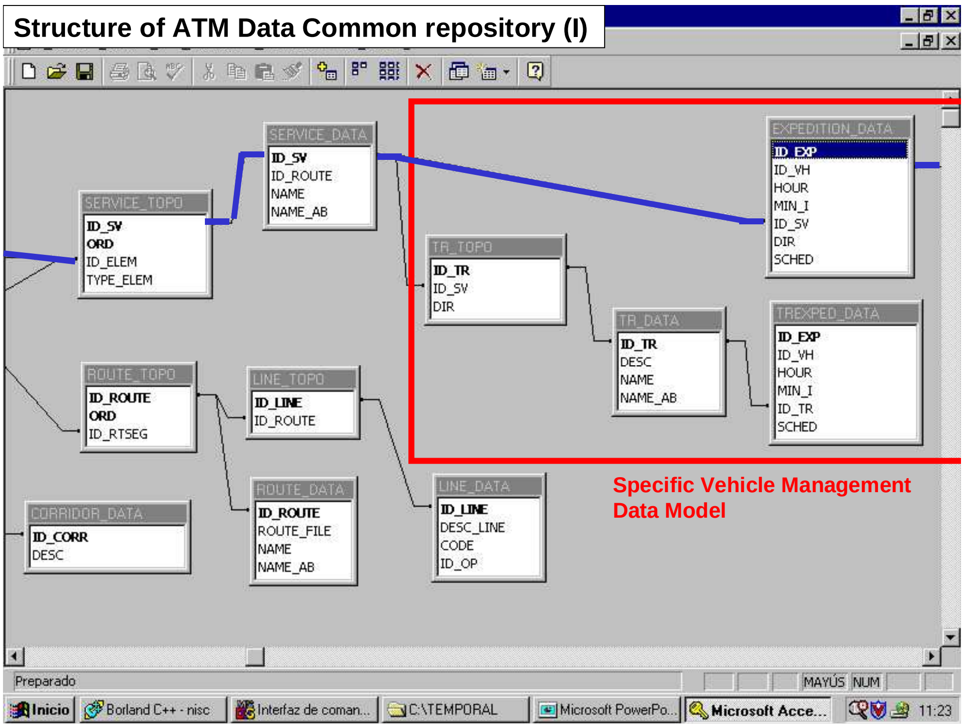


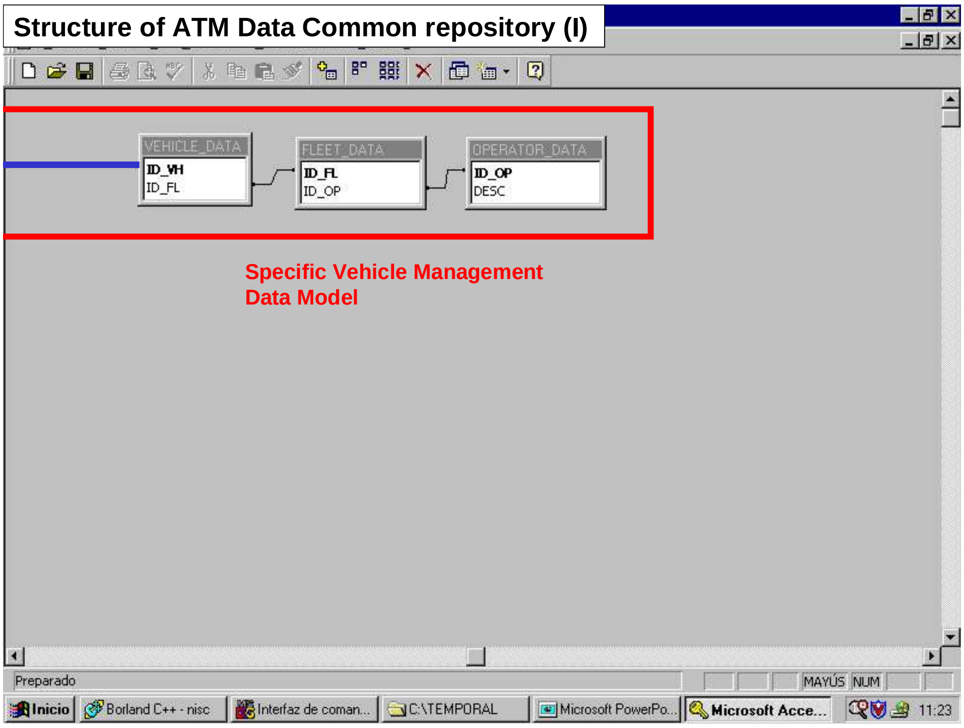
DATA_TABLE: Contains basic information about elements (name, description, length,...).

GEO_TABLE: Contains the geometry of elements (coordinates).

TOPO_TABLE: Contains the topological relationships with other elements.


Structure of ATM Data Common repository (I)
INT_GEO
ID_INT
COORD_X
COORD_Y
INT_DATA
ID_INT
INT_TOPO
ID_INT
ID_INFSEG
TERMINAL_TOPO
ID_TERM
ID_STOP
TERMINAL_DATA
ID_TERM
DESC
STOP_GEO
ID_STOP
COORD_X
COORD_Y
STOP_DATA
ID_STOP
NAME
NAME_AB
GPS_X
GPS_Y
STOP_TOPO
ID_STOP
ID_INFSEG
PERCENT
ROUTESEG_TOPO
ID_RTSEG
ORD
ID_ELEM
TYPE_ELEM
PERCENT_1
PERCENT_2
INFSEG_GEO
ID_INFSEG
ORD
COORD_X
COORD_Y
INFSEG_DATA
ID_INFSEG
TYPE
EDGID
ID_VIA2
ID_FER
INFSEG_TOPO
ID_INFSEG
TYPE_NODE1
ID_NODE1
TYPE_NODE2
ID_NODE2
TLATLAS_STN
EDGID
TIPOL
FUNC
NOMEC
NAME
RAIL
ID_FER
TIPOL
NAME
CORRIDOR_TOPO
ID_CORR
ORD
ID_INFSEG
Preparado
MAYÚS NUM
Inicio
Borland C++ - nisc
C:\TEMPORAL
Microsoft Access - [...
Microsoft PowerPoint - [E...
18:48


Structure of ATM Data Common repository (I)
SERVICE_DATA
ID_SV
ID_ROUTE
NAME
NAME_AB
EXPEDITION_DATA
ID_EXP
ID_VH
HOUR
MIN_I
ID_SV
DIR
SCHED
SERVICE_TOPO
ID_SV
ORD
ID_ELEM
TYPE_ELEM
TR_TOPO
ID_TR
ID_SV
DIR
TR_DATA
ID_TR
DESC
NAME
NAME_AB
TREXPED_DATA
ID_EXP
ID_VH
HOUR
MIN_I
ID_TR
SCHED
ROUTE_TOPO
ID_ROUTE
ORD
ID_RTSEG
LINE_TOPO
ID_LINE
ID_ROUTE
ROUTE_DATA
ID_ROUTE
ROUTE_FILE
NAME
NAME_AB
LINE_DATA
ID_LINE
DESC_LINE
CODE
ID_OP
CORRIDOR_DATA
ID_CORR
DESC
Specific Vehicle Management
Data Model
Preparado
MAYÚS NUM
Inicio
Borland C++ - nisc
Interfaz de coman...
C:\TEMPORAL
Microsoft PowerPo...
Microsoft Acce...
11:23



INFSEG_GEO: Geometry table of Infrastructure Segment

ID_INFSEG	ORD	Coord_x	Coord_y
19001267	1	420500,34	4434567,35
19001267	2	420502,54	4434568,34
19001267	3	420513,41	4434564,87
19001267	4	420515,16	4434562,55
19001267	5	420517,23	4434561,34
19001267	6	420518,34	4434560,91
19001268	1	422545,56	4585878,57
19001268	2	422546,54	4585872,47
19001268	3	422548,26	4585874,55

Format of the ATM Data Common repository (sample)

ID_INFSEG: Infrastructure segment Identifier
ORD: Order of points.
Coord_x: x coordinate
Coord_y: y coordinate

INFSEG_TOPO: Topology table of Infrastructure Segment

ID_INFSEG	ID_NODE1	TYPE_NODE1	ID_NODE2	TYPE_NODE2
19000001	13000178	1	56001135	2
19000002	13000179	1	13000184	1
19000003	13000179	1	56001134	2
19000004	56013485	2	56005463	2

ID_INFSEG: Infrastructure segment Identifier
ID_NODE1: Initial node identifier
TYPE_NODE1: Type of initial node (1=Intersection; 2=Stop)
ID_NODE2: Final node identifier
TYPE_NODE2: Tipo del nodo final (1=Intersection; 2=Stop)

Carme Fabregas, ATM
Andreu Esquius, Meritxell Font, Mcrit

ATM Planning Support System

2.6. AVV (Taale): PLATOS, experiences in The Netherlands

PLATFORM ASSIGNMENT AND SIMULATION MODELS

Henk Taale
AVV Transport Research Centre

Contents

- What is PLATOS?
- History
- Activities
- Organisation
- Projects and results
- Data for models
- Evaluation

What is PLATOS?

- True Public Private Partnership (PPP)
- Government, Consultants, Universities
- Problems
  - current models inadequate to answer relevant questions
  - data collection and formats
- Goal: development of modelling system and knowledge transfer

History

- 1995: first talks
- 1996: start document by three partners
- 1997: business plan PLATOS
- 1998: signing the agreement by 10 partners
- 1998-2001: doing projects
- 1999: change financial structure
- 2001: evaluation

Activities

- User requirements
- Specification modelling system
- Research
- Data handling and transfer between models
- Model development
- Validation
- Knowledge transfer

Organisation

- Organisation
  - steering committee
  - programming workgroup
  - project groups
- Financial structure
  - fund for projects
  - money and man hours

Projects and results

- Guidelines for validation of models
- Dynamic OD estimation program
- Traffic flow during congestion
- Consequences for models of new transport policy
- Standardisation measurement data for models

Knowledge transfer

- Presentations
- Symposium for Dutch model developers and users
- Website (www.oag.nl/platos)
- Articles

Data for models (1)

- Growing need for data for models: input, calibration and validation
- Expanding monitoring
  - 1300 km motorways and other main roads
  - 7 traffic management centres
  - 1 traffic information centre
- Variety in systems and data formats

Data for models (2)

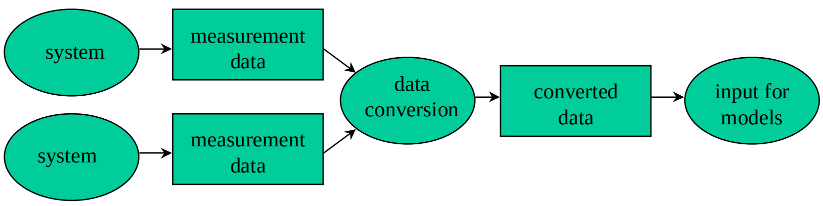
- Project phases
  - state of the art data availability and needs
  - defining format for measurement data
  - software development for conversion
  - software development for data management, analysis and visualisation

Data for models (3)

- Data availability
  - monitoring on main road network: several systems with different format
  - monitoring on urban roads: not done frequently, but possible with traffic signal controllers
  - other systems: parking systems, GIS, weather information, road works

Data for models (4)

- Data standardisation



Data for models (5)

- Data needs
  - national/regional models: network, OD matrix, travel motives, user classes, demand
  - dynamic models: network, OD matrix, flows, speeds, travel times, routes
  - microscopic models: network, following behaviour, lane changing behaviour

Data for models (6)

- Developments
  - architecture for traffic management
  - gathering, exchanging, converting and storage of data
- Phase 2: defining format for measurement data for use with dynamic models
- Will the project continue?

Evaluation

- More results than most PPP's
- Less results than hoped for (too ambitious?)
- Lessons learned:
  - a shared problem is very important
  - good project management is invaluable
  - good research program is needed
- Future of PLATOS unsure

Colofon

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AVV Transport Research Centre

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Fax: +31 10 282 5644

E-mail: h.taale@avv.rws.minvenw.nl

2.7. IWW (Schoch): The IWW European Transport Model and GTF

Please see “Annex: IWW (Schoch): The IWW European Transport Model and GTF”.

2.8. TRT (Martino): GTF: Next step to adopt an standard transport data model

Please see “Annex: TRT (Martino): GTF: Next step to adopt an standard transport data model”.

2.9. Minerva (Logie): Experiences from TRIPS and observations from past experiences

TRIPS, GIS and forecast models

Observations and Experience of GTF Issues

Miles Logie

11th October 2001 Minnerva - GTF Workshop

Background

- Development work with TRIPS software has encountered many issues relevant to GTF
- Major design activity considered new paradigms for data and software
  - Object orientation
  - Components
  - Data handling
  - GIS

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Definitions of Objects

- Need for built-in flexibility
  - Change is inevitable; polymorphism helps
- Categories of objects
  - GTF strong for networks
    - Sufficient for dynamic modelling?
  - Sufficient for demand modelling?
    - Objects relating to people and freight
  - Handling different scales
    - Paradigm of changing scales in GIS

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Aids to GTF Object Model

- Packages
  - Provide an overview
  - Makes easier to understand and manage
- Components
  - Practical and flexible approach to implementation
  - Design based around definition of interfaces
    - Compatible with object orientation
  - Requires librarian of components
    - Spotlights is suitable organisation

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Minnerva
Networked Wisdom

Experience with TRIPS

- Data transfer
  - Highway networks, trip matrices, and zonal data is OK
  - Intersection data, traffic signal data, PT walk/access networks, timetables, etc is not OK
- Model structure
  - A distinctive feature of TRIPS
  - Useful to be able to transfer between applications

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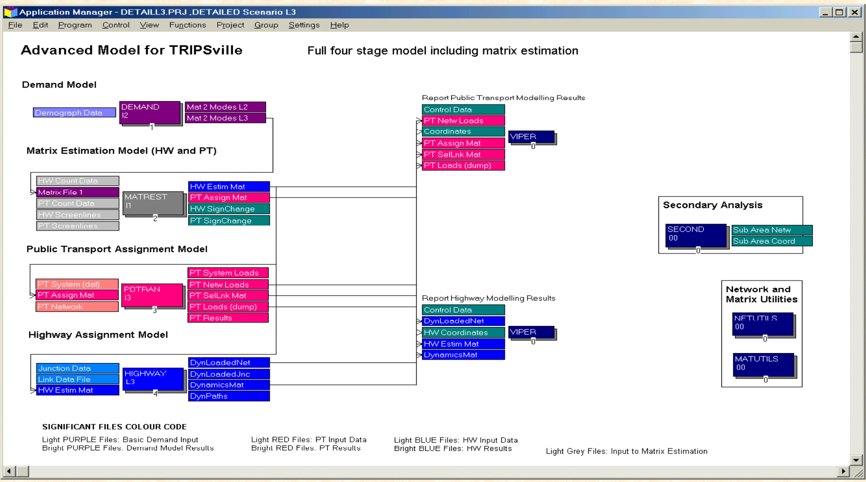
Minnerva
Networked Wisdom

Model Structure in TRIPS



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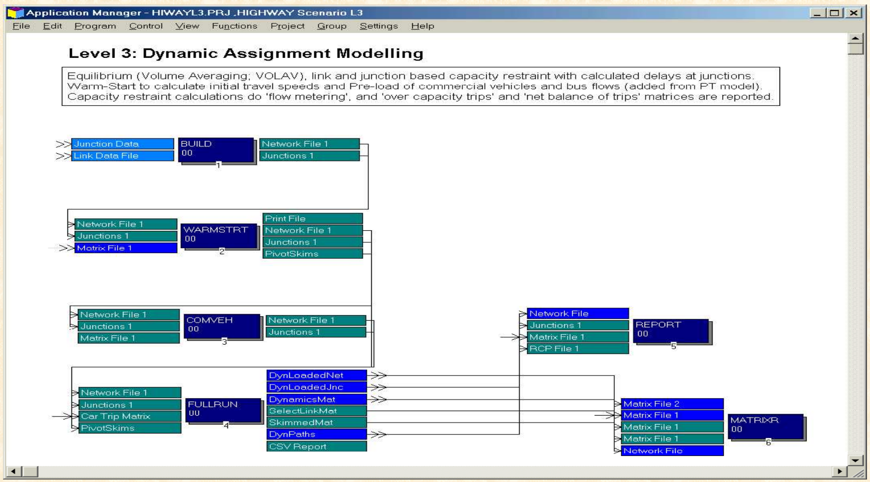
Further details of structure



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TRIPS experience, continued

- Command language
  - Scripts are data too!
  - Concept of components allows transfer of modelling forms
- Integration with GIS
  - Modelling needs simpler networks than GIS presentations
    - Must exploit proprietary network data, e.g. MapInfo's StreetPro
    - Facilities demonstrated to remove un-required details for model while retaining detailed view for GIS viewing

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Please see "Annex: Minerva (Logie): Experiences from TRIPS and observations from past experiences".

2.10. ME&P (Williams): Role of GTF

Please see “Annex: ME&P (Williams): Role of GTF”.

2.11. RAND (Walker): Policy variables

Please see “Annex: RAND (Walker): Policy variables”

2.12. NEA (Burgess): The European Transport Model Directory (MDir) Analysis of MDir relevant for GTF

SpotlightsTN GTF workshop

Spotlights TN "keys to bring advanced models to lights":

- Quality control procedures and deontologic codes (Dcode)
- Harmonised descriptions models in European directory (MDir)
- Data formats (GTF) for standardised data exchange
- Long term opportunities (LT) for model integration

D9900150

SpotlightsTN GTF workshop

Framework

- 1. Name
- 2. Policy relevance
- 3. Accessibility
- 4. Input data
- 5. Formulation
- 6. Outputs
- 7. Software & hardware
- 8. Audits

D9900150

SpotlightsTN GTF workshop

PROCEDURE

- Set up framework
- Filling with information
- Adapting framework
- Self-sustaining

D9900150

SpotlightsTN GTF workshop

Table Overview of used software in models

MODELLING SOFTWARE	Frequency
not known	106
Statistical package (SAS/SPSS)	2
GIS (Transcad)	2
C/C++	3
Pascal/Delphi	9
Fortran	9
EMME/2	22
GAMS (General Equilibrium Modelling)	1
ITHINK/STELLA (simulation)	2
WINDOWS/OFFICE (Excel/Access/OS)	10
In House Developed Software	33
Minutp	6
Saturn	5
Polydrom (=3)/Qview (=1)	4
TRIPS	3
PTVision	1
TRIO	1
Vissem/Vissum	3
Total	222

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SpotlightsTN GTF workshop

MODSOF * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
MODSOF	not known	29	19	29	26	3	106
	statist.			2			2
	GIS		1			1	2
	C		2	1			3
	Pascal		4	2		3	9
	Fortran		5	4			9
	EMME/2	1	7	10	3	1	22
	GAMS		1				1
	ITHINK					2	2
	WINDOWS		6	3		1	10
	In House		9	12	5	7	33
	Minutp		1	3	2		6
	Saturn		4	1			5
	Qview		1	2		1	4
	TRIPS			2		1	3
	PTVision					1	1
	TRIO			1			1
	Vissem		3				3
Total		30	63	72	36	21	222

D9900150

SpotlightsTN GTF workshop

Table *Used GIS software in the model.*

GIS SOFTWARE	Frequency
Not known	167
3D Geographical	1
ArcInfo	5
Atlas GIS	1
Bridges/NIS	1
GIS environment	2
IWW-software	1
Mapinfo	4
MVGRAF network	3
Transcad	1
No GIS applied	36
Total	222

D9900150

SpotlightsTN GTF workshop

Table Used Database software in the model.

DATABASE SOFTWARE	Frequency
Not known/relevant	202
Access	5
Clipper	1
DBF/Clipper	3
Delphi/Pascal binary	2
DOS FORTRAN	1
Excel	4
ORACLE, SQL	1
Visual Basic	3
Total	222

D9900150

SpotlightsTN GTF workshop

Relation with other models

37 models have at the moment linkage to other software

20 models are for sure not integrated

165 models not known (probably not)

D9900150

SpotlightsTN GTF workshop

Table *Policy variables related to the models*

FIRST_KEYWORD	Frequency
Not known	25
capacity utilisation	9
demand analysis	15
Environment and emissions	10
ex-ante policy analysis	13
industrial location decisions	1
Infrastructure planning	47
intermodal solutions	2
Investment analysis	1
land-use planning	6
modal shift	2
Pricing	15
project impact assessment	6
public transport planning	19
safety	1
strategic mobility	36
traffic management	13
water management effects	1
Total	222

D9900150

SpotlightsTN GTF workshop

FIRST_KEYW * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
FIRST_KEYW		12	3	7	3	1	26
	capacity utilisation		6	3			9
	demand analysis	2	3	2	5	3	15
	environment and emissions	3	4	2		1	10
	ex-ante policy analysis	2	2	7	1	1	13
	industrial location decisions		1				1
	infrastructure planning	3	8	15	19	1	46
	intermodal solutions	2					2
	investment analysis			1			1
	land-use planning		6				6
	modal shift			1		1	2
	pricing	1	6	3	1	4	15
	project impact assessment	1	1	2	1	1	6
	public transport planning		6	8	1	4	19
	safety	1					1
	strategic mobility	1	10	18	4	3	36
	traffic management	2	7	2	1	1	13
	water management effects			1			1
Total		30	63	72	36	21	222

D9900150

SpotlightsTN GTF workshop

TYPE MODAL SPLIT * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
TYPE MODAL SPLIT	not known	25	27	11	1	4	68
	direct deman			11		6	17
	choice m. agg					1	1
	choice m. dis	1	1	8		2	12
	choice m.	2	8	6	5	5	26
	MCMMN		1			1	2
	Simulation			4	2		6
	modal split		11	14	19	3	47
	not appl.	2	15	16	8	2	43
Total		30	63	70	35	24	222

D9900150

SpotlightsTN GTF workshop

Conclusion

- Overview of models
- Time to fill in
- Clarity of the form
- Maintenance required
- Relation to DCode

D9900150

Please see “Annex: NEA (Burgess): The European Transport Model Directory (MDir) – Analysis of MDIR relevant for GTF”.

MCRIT (Cañas): Long-term visions for e-government the European Transport policy-support system (ETIS)

Mcrit
Long term visions for Policy Support Systems (e-government)
New generation of web technologies based on:

1.- XML
2.- RDF
3.- Ontologies
4.-Intelligent Agents

[1]Click Here to Start
Developed by Mcrit 2001. For suggestions or comments, contact
[2]info@mcrit.com

References
1. file://localhost/data/b/spotlights/MCRIT/LTV/IWD/index.htm
2. mailto:info@mcrit.com

EU 5th research framework spotlightsTN

GTF Workshop
by [1]Enric Cañas Alonso
Long-term visions for e-government:
the European Transport policy-support system (ETIS)

Enric Cañas, Eng.
Andreu Ulied, Dr. Eng.

Mcrit sl

Introduction

The long-term view of ETIS, as well as for any other computerised decision-support system, is achieving the paramount goal of proving users with "maximum capabilities with minimum access difficulties".

· Maximum capabilities in the sense of integrating all existing scientific knowledge (the most advanced information, forecast and evaluation models) in an optimal manner to support a given decision.

· Minimum access difficulties in the sense of getting on-line interactive access through customised user-friendly interfaces, helpful for decision-makers, policy-analysts, interested parties and citizens.

Even if it is a "long-term goal", the current evolution of computer-related technologies goes in this direction. Broadly speaking, the first wave of ICT (1950-1990) was focused on the development of large mainframe computers managed by large institutions and universities to develop advanced scientific models; the second wave (1990-2000) has been focused on Personal Computers and Internet as a communication network where "everybody" has to be linked; the third wave, still in embryonic formation, is about connecting both worlds, making Internet not just a network to exchange information but also knowledge. Personal Computers and friendly multimedia applications does not remove the need for large supercomputers and sophisticated systems, just the opposite. As more persons and institutions are demanding better information and soon also more advanced knowledge and decision-support services, there will be an increasing need for making somehow available to them the scientific capabilities of the complex models that can be run by large and world-wide disperse computer's systems. For instance, people travelling home Friday afternoon do not want just an Internet navigation on the map of a city or visualise congested streets, they simply would like to know "which road to take now".

Two new technologies under research are focused on achieving this goal:

· At a "software" level: The Semantic Web technologies, in which Data Model, Knowledge languages and Ontologies play a key role making "computerised knowledge compatible".

· At a "hardware" level: The Grid technologies, which allow an optimal use of networked computer capabilities needed to run large forecast, evaluation and decision-support models on-line.

The Semantic Web

The Semantic Web (SW) is a new form of Web content that is meaningful to computers instead than to people, and is expected to unleash a new wave of services and applications in the coming years. The SW is not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in co-operation. The first steps in weaving the Semantic Web into the structure of the existing Web are already under way. In the near future, these developments will usher in significant new functionality as machines become much better able to process and "understand" the data that they merely display at present. There are several technologies that make the foundation for this advance, where the main is the next:

· XML
· RDF
· Ontologies
· Intelligent Agents

Or the successive improvements or related technologies DAML, SHOE,
·

The real power (SW) will be when combining this incipient technologies with the:
1- KQML (to archive a truly swarming).
2- Or Applying the concepts of Experts Systems or Fuzzy logic (IA)

XLM

XML is a language that lets every one create their own tags -hidden labels such as <zip code> or <alma mater> that annotate web pages or sections of text on a page. Scripts or programs, can make use of these tags in sophisticated way, but the script writer has to know what the page writer use each tag for. In short, XML allows users to add arbitrary structure o their documents but says nothing about what the structures mean.

RDF

Meaning is expressed by RDF, which encodes in sets of triples, each triple being rather like the subject, verb and object of an elementary sentence. These triples can be written using XML tags.
In RDF, a document makes assertions that particular things (people, Web pages or whatever) have proprieties (such as "is a sister of", is the author) with certain values (another person, another Web page). This structure turns out to be a natural way to describe the vast majority of data processed by machines.
Subject and object are each identified by a Universal Resource Identifier (URI), just as used in a link or a Web page. (URLs, Uniform Resource Locators, are the most common type of URI). The verbs are also identified by URIs, which enables anyone to define a new concept, a new verb, just by defining a URI for it somewhere on the Web.
The triples of RDF form webs of information about related things. Because RDF uses URIs to encode this information in a document, the URIs ensure that concepts are not just words in a document but are tied to a unique definition that everyone can find on the Web. For example, imagine that we have access to a variety of databases represent names and which represent zip codes. RDF can specify that "(field 5 in a database A)(is a field of type) (zip code), "using URIs rather than phrases for each term.
To avoid that two databases may use different identifiers for what is in fact the same concept, such as zip code we can use ontologies.

Ontology

Ontologies have become common on the World-Wide Wed. The ontologies on the Web range from large taxonomies categorizing the Web (such as Yahoo!) to categorizations of products for sale and their features (such as on Amazon.com). The W3C is developing the Resource Description Framework, a language for encoding knowledge on Web pages to make it understandable to electronic agents searching for information. The Defence Advanced Research Projects Agency (DARPA), in conjunction with the W3C, is developing DARPA Agent Markup Language(DAML) by extending RDF with more expensive constructs aimed at facilitating agent interaction on the Web.

Grid technologies for building Virtual Organizations (VO)

In the "HARDWARE" side, there is a working line represented by the GRID Computing, after to realise of limitations in current equipment to deal efficiently with high volume - high-speed data traffic applications.

The ubiquity of Web technologies (i.e. IETF and W3C standard protocols - TCP/IP, HTTP, SOAP, etc- and languages as HTML and XML) makes them attractive as a platform for constructing Virtual Organizations. However, while these technologies do an excellent job for supporting the browser-client-to-web-server interactions that are the foundation of today’s Web, the lack of features required for the richer interaction models occur in VOs. For example, today’s Web browsers typically use TLS for authentification, but do not support single sing-on or delegation.

The Grid is a next generation Internet. The grid is not an alternative to "the Internet" it is rather a set of additional protocols and services that build on Internet protocols and services to support the creation and use of computation -and data-enriched environments. Any resource that is "on the Grid" is also, by definition "on the Net".

The Grid is a source of free cycles. Grid computing does not imply unrestricted access to resources. Grid computing is about controlled sharing. Grid architecture must incorporate resource and collective protocols for exchanging usage and cost information, as well as for exploiting this information when deciding whether to enable sharing.

The Grid requires a distributed operating system. In this view, Grid software should define the operating system services to be installed on every participant system, with these services providing for the Grid what an operating system provides for a single computer.

The Grid requires new programming models. Programming in Grid environments introduces changes that are not encountered in sequential (or parallel) computers, such as multiple administrative domains, new failure models, and large variations in performance.

There are 2 EU projects that are advancing in this area : EURO-GRID and DATA-GRID.

The EUROGRID project is a shared cost Research Technology project (RDT). The EUROGRID project will demonstrate the use of GRIDs in selected scientific and industrial communities, address the specific requirements of these communities and highlight the benefits of using GRIDs.

The objectives of the EUROGRID project are:
· To establish a European GRID network of leading High Performance Computing centres from different European countries.
· To operate and support the EUROGRID software infrastructure. The EUROGRID software will use the existing Internet network and will offer seamless and secure access for the EUROGRID users.
· To develop important GRID software components and to integrate them into EUROGRID (fast file transfer, resource broker, interface for coupled applications and interactive access).
· To demonstrate distributed simulation codes from different application areas (Biomolecular simulations, Weather prediction, Coupled CAE simulations, Structural analysis, Real-time data processing).
· To contribute to the international GRID development and to liase with the leading international GRID projects.

To productise the EUROGRID software components. After project end the EUROGRID software will be available as supported product.

e-logistics

What is e-logistics? The most direct answer is : "the logistics of e-commerce", but we should clarify how does the logistics of e-commerce differ from "conventional" logistics . Up to now, there is not a clear and precise definition of e-logistics, something that also happened to VTMIS (Vessel Traffic Management Information System) concept in the mid 90’s. But in SEWING-TN we will try to define the term if we want the entire e-logistics operating process to satisfy the expectations of suppliers and their customers alongside the supply chain. Our standpoint is that e-logistics means more choices, more services, and more information. More logistics services inevitably means more logistics providers in order to allow suppliers to look for the most competitive price. The supplier may choose its providers according to the logistics options that it wants to offer its customers. It means to have tools, which today are not fully available, but the Semantic Web technologies promise to offer.

By other hand, e-logistics means not only more services, but also more information -including more information shared in real time. In SEWING-TN framework, the logistics information shared between players inside and outside the logistic chain is a mean to improve the process, control the quality of the logistics service, and reassure the cargo reaches the final recipient. This information is important for customers, but it is even more important for suppliers. Without it, the supplier cannot assess the quality of their logistics organisation.

Conclusion
Impressive as these emerging technologies maybe, it is fair to say that we still have a long way until achieving the "Global Village" vision of the Canadian MacLuhan, the cybernetic vision of the American Gregory Bateson, the "Nosphere" vision of the French priest Teillard du Jardin, or magical vision of the Catalan philosopher Ramon Llull, which imagined "Arts Magna", a wonderful virtual machine able to answer any question according to all existing human knowledge.

Developed by Mcrit 2001. Suggestions and comments or information, contact [2]info@mcrit.com

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2. mailto:publisher@web-data.org

2.13. MKmetric (Ruffert): GTF Conceptual Model in detail

spotlightsTN GTF

1. Requirements
2. Development
3. Way forward

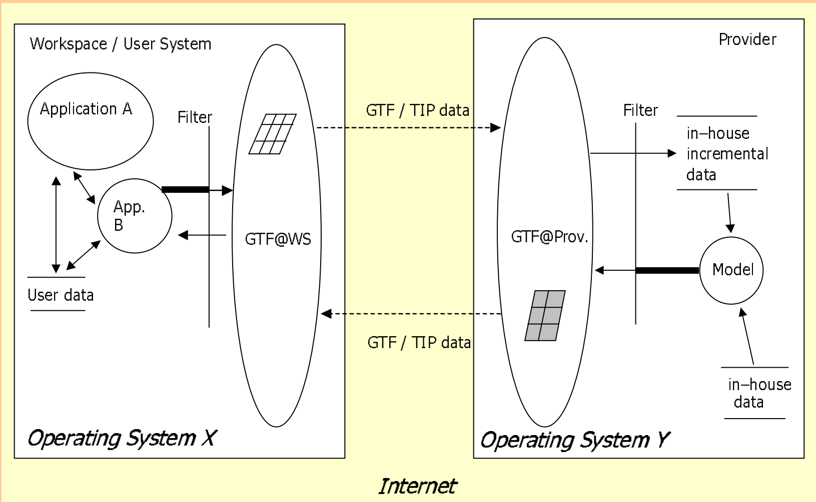
Eduard Ruffert & Dr. Benedikt Mandel

email: ruffert@mkm.de & mandel@mkm.de

MKmetric Gesellschaft für Systemplanung mbH, Karlsruhe

11/12th October 2001 Barcelona MKmetric

Interchange structure



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Overview of requirements

Supporting Model Communication

1. Model requirements:

GTF = Generalised Transportation data Format
- EDI format to exchange transportation modelling information
- not to impose formats or contents constraints on modellers exchanging data
- not specifically for GIS

GTF specifies building blocks (entities)
GTF is a general structure of the information transport models use

Principles:
- not too many basic building blocks (generic entities)
- generalised enough for (mainly) modelling information and (also) other information

• GTF = Exchange of Data (homogeneous & generic)

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Overview of requirements

Supporting Model Communication

2. EDI requirements:

- cross-platform
- structured & segmented
- flexible & scalable
- use of existing standards
- human readability

⇒ CONTENTS of GTF : GTF Conceptual Model (GTF-CM)
⇒ FORMAT & PROTOCOL : GTF-XML

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Universe of GTF

GTF = "Generalised Transportation-data Format" - the conceptual model

GTF-XML = the underlying transmission format

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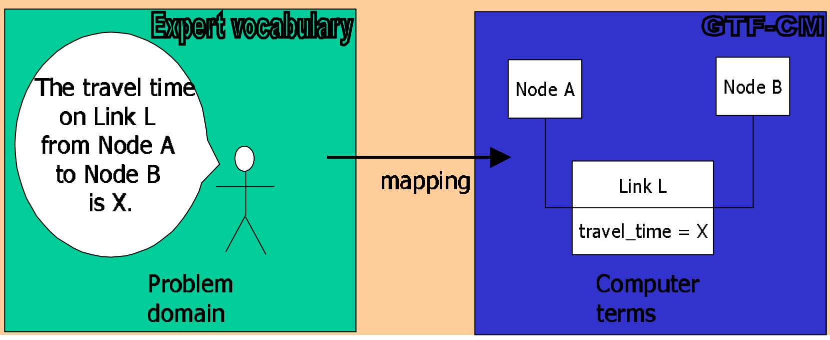
Development: GTF definition

GTF = for the exchange of strategic transportation modelling information

⇒ GTF-CM is means of discussion

= capture the vocabulary of the problem domain in computer terms



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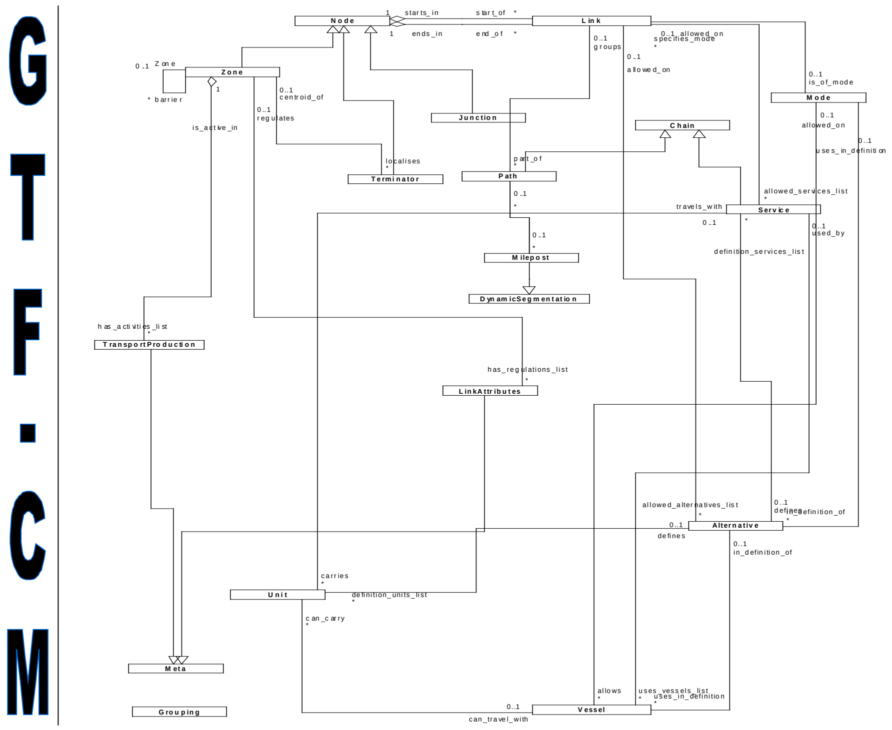
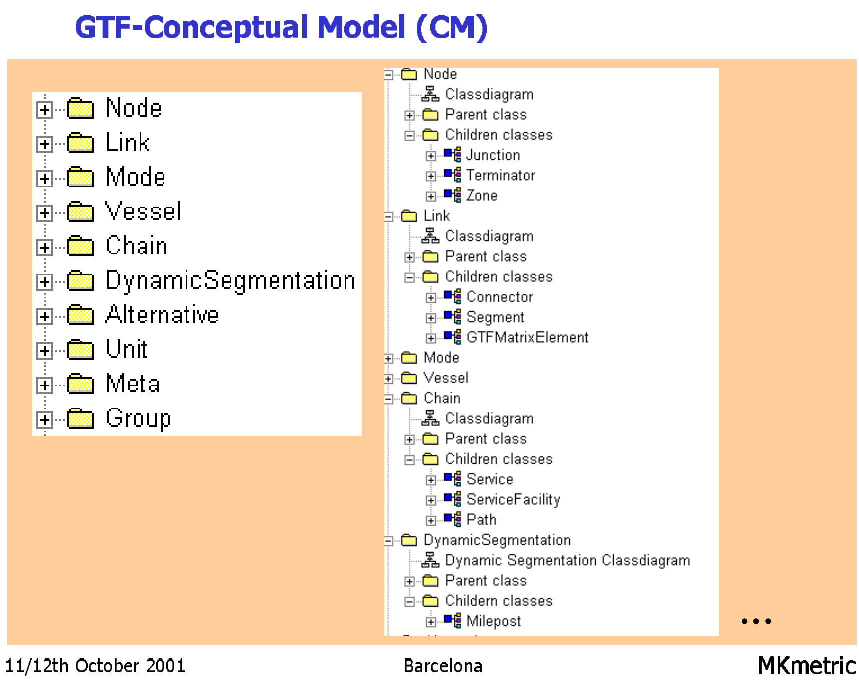

GTF.CM
Node
Link
Zone
Junction
Terminator
Path
Chain
Mode
Service
Milepost
DynamicSegmentation
TransportProduction
LinkAttributes
Alternative
Unit
Meta
Grouping
Vessel
starts_in
start_of
ends_in
end_of
groups
allowed_on
specifies_mode
is_of_mode
centroid_of
regulates
barrier
is_active_in
localises
part_of
travels_with
allowed_services_list
uses_in_definition
used_by
definition_services_list
has_activities_list
has_regulations_list
allowed_alternatives_list
defines
in_definition_of
carries
definition_units_list
can_carry
allows
uses_vessels_list
can_travel_with


GTF-Conceptual Model (CM)
Node
Link
Mode
Vessel
Chain
DynamicSegmentation
Alternative
Unit
Meta
Group
Node
Classdiagram
Parent class
Children classes
Junction
Terminator
Zone
Link
Classdiagram
Parent class
Children classes
Connector
Segment
GTFMatrixElement
Mode
Vessel
Chain
Classdiagram
Parent class
Children classes
Service
ServiceFacility
Path
DynamicSegmentation
Dynamic Segmentation Classdiagram
Parent class
Childern classes
Milepost
...
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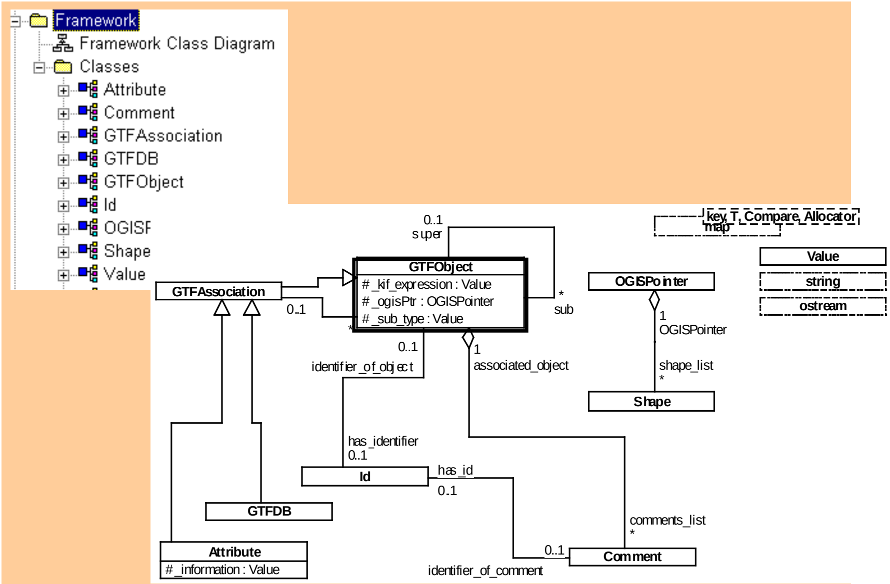
Principles / Framework classes for GTF-CM specification



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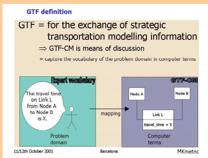
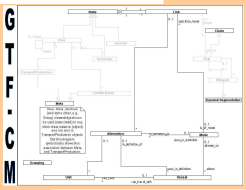
OO concepts overview

Development views

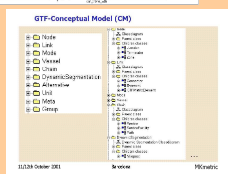
1. Conceptual



2. Specification



3. Implementation



Where are we now? Why?

1 + 2 +3

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OO concepts overview

Sequence of development steps?

First 1. Conceptual

Then 2. Specification

Then 3. Implementation

In detail …

on the basis of MoU …

and propsed GTF Specification.

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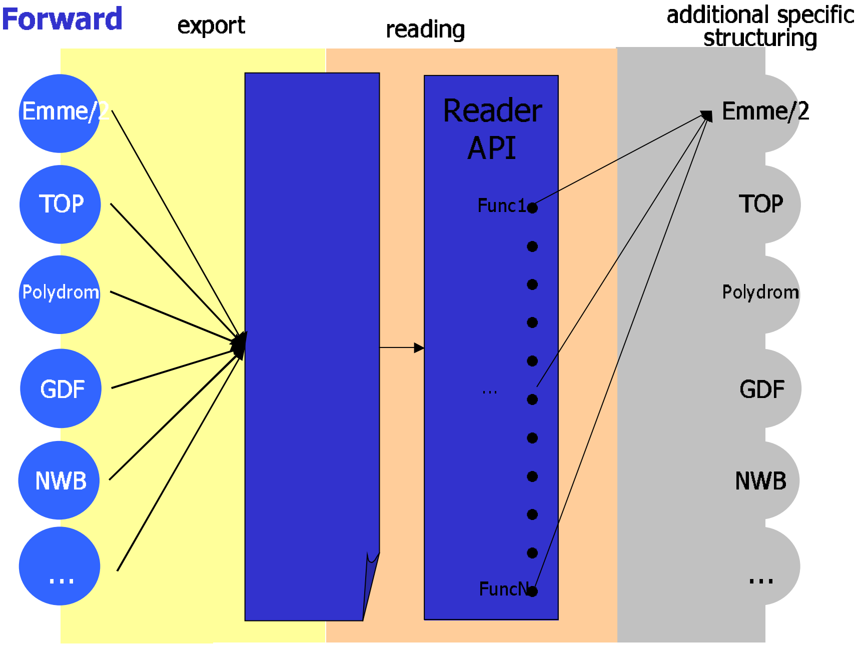
Way Forward



15th August 2001 **GTF = mediator format** MKmetric

Further steps after spotlightsTN

- From “Conceptual Model” to “Data Model”
- From “Common Understanding” to “Ontology”
- Standardisation
- Library of procedures

11/12th October 2001 Barcelona MKmetric

Minutes

Minutes of the third SPOTLIGHTS TN WORKSHOP

"GTF: Next step to adopt a standard transport data model"

Barcelona, 11th-12th October 2001.

(Note: The presentations / papers can be found in this deliverable, in the sections above. It is recommended to study these documents beforehand as the minutes just reflect the major points of the discussion.)

Welcome

Dr Sera welcomed the workshop participants and gave a short speech about the venue and the history of IET (Institute of Territorial Studies). He then pointed out the necessities and benefits to be gained from standardisation, especially the standardisation of data formats and data models and that therefore it is worthwhile putting efforts in the spotlightsTN project.

Introduction

Ulied (Presentation) "Objective of the workshop GTF/LTV."

The long-term view of ETIS, as well as for any other computerised decision-support system, is achieving the paramount goal of proving users with "maximum capabilities with minimum access difficulties".

- Maximum capabilities in the sense of integrating all existing scientific knowledge (the most advanced information, forecast and evaluation models) in an optimal manner to support a given decision.

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Even if it is a "long-term goal", the current evolution of computer-related technologies goes in this direction. Broadly speaking, the first wave of ICT (1950-1990) was focused on the development of large mainframe computers managed by large institutions and universities to develop advanced scientific models; the second wave (1990-2000) has been focused on Personal Computers and Internet as a communication network where "everybody" has to be linked; the third wave, still in embryonic formation, is about connecting both worlds, making Internet not just a network to exchange information but also knowledge. Personal Computers and friendly multimedia applications does not remove the need for large supercomputers and sophisticated systems, just the opposite. As more persons and institutions are demanding better information and soon also more advanced knowledge and decision-support services, there will be an increasing need for making somehow available to them the scientific capabilities of the complex models that can be run by large and world-wide disperse computer's systems. For instance, people travelling home Friday afternoon do not want just an Internet navigation on the map of a city or visualise congested streets, they simply would like to know "which road to take now".

Impressive as these emerging technologies maybe, it is fair to say that we still have a long way until achieving the "Global Village" vision of the Canadian MacLuhan, the cybernetic vision of the American Gregory Bateson, the "Nosphere" vision of the French priest Teillard du Jardin, or magical vision of the Catalan philosopher Ramon Llull, which imagined "Arts Magna", a wonderful virtual machine able to answer any question according to all existing human knowledge.

Panagopoulou (Speech) “EU's aim with GTF concerning ETIS”. There's a need to define a mechanism to integrate all different models and types of models with GIS applications and an interface to have access to all kinds of information in databases, so that answers to policy makers can be given.

Decision-making at the EU and national levels needs support; therefore, ETIS will be an European Policy Information System, which is easy and user-friendly to access data. For a policy system, just data is not enough for decision-making. What is needed is a reformatting of data so that the system is able to answer your query, e.g. forecast of an implementation of policies. The main components from the user point-of-view are a good user-interface (to data) and a good GIS interface (to present results). At the EU level, the decision-makers need more (than one global) transportation models of different types and more (than one global) GIS of different types. Therefore the need is to exchange data between models and between models and GIS and co-operation between national and European institutions, this will be ETIS.

Turró (Speech) EIB works in the economic profitability of projects, so they need models to read information from promoters in a common format to understand data given and to do appraisal exercises of the projects and get outputs of interest of it.

EIB is aiming to be able ask different consultants relevant questions about the projects to be financed and have answers on line through Internet and get different opinions about the same questions in a quick and understandable manner.

EIB finances projects esp. transport infrastructure projects approx. 70 bill. EURO / year. Projects of European interest. The main aim or interest for EIB is a system that supports them in profitability studies. EIB uses transport models in evaluation of projects.

The sequence broadly is

Receive the relevant information from the project’s promoters, e.g. what are they doing? Maybe asking for additional model runs with changed variables

Make an own appraisal of the project to see if they are adequate. In this context, the EIB would like the possibility of asking external consultants easily and quickly to evaluate a project, e.g. by accessing the consultant’s services through the Internet.

Nevertheless, the main requirement for project evaluation is to have adequate and consistent forecasts!

Therefore, there is also the need to establish procedures and criteria to develop a consistent and valid database in the long term.

Currently the EIB is creating a monitoring system for the Balkans. Projects to be financed. There is a need to define a basic Network (like TINA) and so a development of database is needed, this project should be done in a short term of time (few weeks).

Supply models are increasingly important since the forecasts for traffic is +40% until 2010, i.e. models of congested situations are needed, see white book. Current transport models do not address this problem properly. In addition, UIC, EIB and EC are working on new criteria to evaluate railway infrastructure projects. Models have to reflect these new requirements.

Railways are also very poorly treated. Precise criteria and guidelines for evaluation of railway projects e.g. same capacity definitions in all data, are needed.

Also increasingly important is to quantify e.g. reliability or comfort measures, as these are strong criteria in the upcoming congested transport. Introduction of new elements in the model like reliability, comfort, service etc. apart of the cost-economic typical variables (time savings, safety, VOT). This is critical to establish traffic forecasts. The same holds for cohesion factors, e.g. accessibility etc.

The requirements of the main EIB users are

Seeing a GIS map before and after a scenario (e.g. differences)

Internet access to data and models

To be able to ask several consultants and get results, then to compare in order to increase the quality of our own forecast.

Moreover, the main necessity is that information is consistent and that the models correspond to the needs of the EIB.

Ruffert (Presentation - replacing **Dr Mandel** as he was very hoarse and therefore preferred to discuss topics from person to person rather than at the round table, because raising his voice was very strenuous.) “Introduction to GTF”.

"GTF – data, model and machine interaction". The current situation is: inhomogeneous data structures and inhomogeneous transport model inputs/output formats. GTF is a proposed solution. It is not to impose a database structure but to suggest a way of translating proprietary structures into a mediator structure (the GTF Conceptual Model). Then the mediator structure can be translated back to a proprietary structure at the other end of an exchange.

First session: "Interest and feasibility of Transport Policy Support Systems"

Walker (Presentation) “Think-Up Policy Variables”. Framework of Transport Information Systems: there are different scenarios (unpredictable variables) and policies (controlled variables) pointing to several goals, all in a system to get some outcomes. These outcomes can fit or not with the goals of the policy makers, if not, they can change policies and restart all the process again. It is a circle. We need consistency and good information. Once there is a change in the system, we also should see how to reach the goal.

There is always a misunderstanding between "Scenario" and "Policy change". A "Scenario" are changes in variables that cannot be manipulated, e.g. GDP growth etc. "Policy changes" are changes in variables that can be manipulated by the decision-maker, e.g. new infrastructure road.

Ruffert to Panagopoulou What does DG TREN use for terms?

Panagopoulou The decision-makers do not want to worry about whether a piece of the implementation is a "Scenario" or a "Policy change". Both terms are used. It is up to the experts or consultants to define which parts of the description of the decision-maker is a "Scenario" and which is a "Policy change" and how to change the inputs to the models.

Ruffert, Nielsen, Walker There will be a need of a library for modellers to map proprietary structures onto GTF structures.

Ruffert And XML is used as the format for representing GTF structures

Logie XML is a good standard to use for GTF esp. for accessibility on the Internet. However, there are downsides to XML, therefore more thinking about the right format will be needed.

Williams The conceptual model needs to be independent from the underlying format, because if they were dependant on each other many more problems would arise.

Ruffert They are completely independent.

Van der Loop (Presentation) "Transport Policy Systems in The Netherlands". How to apply and introduce knowledge to policy makers in the framework of the policy cycle: There's the definition of a problem, we generate options, then policy assessment, planning, implementation, ex-post evaluation (policy adjustment) and results. If results do not fit, then the cycle starts again defining again the problem.

The method is to define an objective and indicators, to measure and develop indicators and explain this development and to take the conclusions and the planning. It is very important then to work mainly in result indicators.

Turró EIB goes increasingly in private sector evaluation and Public Private Partnerships, that means more clients with different views, lots of interfaces and arbitrage situations.

Baulies (Presentation) "GIS-PTOP: Spatial Policy Support System". Catalan Ministry of Public Works is developing a GIS (called GIS-PTOP) system concerning to road network on Geomedia. The most important aspect is the definition of a consistent database model. GTF is a good candidate to be implemented.

Second session: "Transport Data Models: Towards a standard data model"

Esquius (Presentation) "ATMax, management and strategic data models: ATMax". ATMax is a real experience of implementing the GTF datamodel. It is an information and network analysis system developed by Mcrit for Barcelona Metropolitan Transport Authority. It contains GIS and database management modules adapted to transport as well as specialised routines for transport analysis (traffic assignments, spatial endowments and scheduling). ATMax is based on the GTF specification developed during the EC project BRIDGES and enriched by discussions at the thematic network project SPOTLIGHTS.

Font (Presentation) "Demonstration of the ATMax system running". Focus on two utilities: dynamics and railway operation system. ATMax datamodel is able to handle advanced transport datamodels useful for both transport strategic and operational planning.

Houée So ATMax is a demonstration that GTF concepts work.

Taale (Presentation) "PLATOS-experience in The Netherlands". PLATOS is a True Public Private Partnership (PPP). Its main goal is the development of a modelling system and knowledge transfer. There's a growing need for: data for models, defining format for measurement data, software development for conversion and software development for data management, analysis and visualisation. However, mainly due to bad project management it is unclear whether PLATOS will be continued.

Logie Where are the benefits of PLATOS for the private investors? These are questions you also should ask for promoting GTF.

Williams What where the reasons for PLATOS?

Taale A platform for discussions about model interfaces and policy monitoring.

Nielsen In Denmark Private Public Partnerships were successful.

Martino How far did PLATOS reach data standardisation?

Taale Not so far. No common data model. This would be the next phase of PLATOS if it is continued.

Nielsen (Presentation) "TOP (Transport Object Platform)". The new object-oriented possibilities now available in GIS to handle topologic complexities beyond the possibilities of earlier, non-object oriented GIS. It is planned as a platform to handle data and the development of applications for transport planning, with emphasis on multimodal networks and associated timetable data.

Ruffert We have heard much about GTF in ATMax, in TOP and the GTF Conceptual Model. To keep things clear: ATMax and TOP are specific implementations of many of the GTF concepts from the GTF-CM. The three have profited by bilateral discussion during development (in BRIDGES and SPOTLIGHTS-TN projects). GTF-CM is the theory, which we are trying to define and standardise. ATMax and TOP are workable implementations of some parts of this theory.

Taale What is the purpose of the TOP system?

Nielsen To have a better platform for the East Denmark Model. Also a better platform for research purposes for new models (which in TOP are by definition directly linked to GIS).

Arnaud What is the aim of GTF?

Mandel Providing a standard format to exchange information between transport models enhancing transparency, cooperation, research and benefiting finally a user friendly access to models for transport policy decision makers. The software providers have to use GTF as standard implementation for data exchange and in consequence, practitioners will use the models automatically.

Warren What kind of interest does ESRI have in TOP?

Nielsen They are marketing it as a new feature of ArcGIS. Since TOP builds on ArcGIS Object Oriented features, ESRI is interested in TOP since TOP cannot be used without ArcGIS.

Ruffert In GTF-CM, the fundamental framework class GTFObject has a pointer field to "OpenGIS object" which can be used to represent the GTFObject graphically. In addition, each GTFObject has another pointer "kif_expression" which can be used to reference a structure in an external KIF (Knowledge Interchange Format) data file/base.

Third session: "Problems and Opportunities implementing GTF"

Logie (Presentation) "TRIPS, GIS and forecast models". TRIPS software is used to study and define networks, to do dynamic modelling and to zoom data at different scales. The main idea of good software is to have an interface to which you give some inputs and then it has to give you some outputs, you feed it with good data and then as a prize, it gives you the outputs.

In Database models, there are easy and difficult parts. The easy part is to define networks, trips, etc. and the difficult part is to define timetables, accessibility to the network and intersections. The model structure must be transference between applications.

The principles and the working out of the GTF-CM class structure are good. But now that the static view is well on the way, the focus needs to shift away from static structure descriptions like in the GTF-CM and more towards dynamic descriptions of operations, i.e. doing something with data. Therefore, more talk should be about "Components and Interfaces". This enables to think more carefully, about what shall be done with the data. The whole exercise of data collecting and data structuring is to be able to answer policy questions, therefore the GTF needs also definitions of operations on the GTF-CM. So the objects

are not just restricted to reflect data, they also have to contain methods (functionality) operating on the data. Then a GTF-database can "do" something not only store data as a specific structure.
In this context, meta-data is very important, even if it is only e.g. the phone number of the data provider so that a user of the data can easily contact the original source etc. The suggestion is to include an "audit trail" for all data sets. Another point is that the handling of scenario data and scenarios as a whole should be defined more strictly. Lastly, GTF should work in line with existing data formats and (also) GIS-data structures. There is a need for a procedure to simplify detailed GIS-data sets into GTF (aggregated functions). In general, reusable things have a standard in the software world, e.g. COM. In addition, this should be checked for applying to GTF.

The terminology used is very difficult and not mature. A "Glossary" of defined terms is needed.

With GTF it is possible to implement a "club idea", i.e. giving and taking data, then given issues of refunding and licensing are solved.

Mandel Referring to the GTF documentation starting at the level of the BRIDGES project reports towards the existing downloadable documentation of SPOTLIGHTS latest GTF version one will find already comments and workouts concerning the data and functionality structure of objects, TIP and KIF extensions of GTF to define operations on models and data, a reflection due to existing standard software applications and the data models they implemented, comments on existing software standards and what is important for GTF and finally the idea of a club, which was developed in the beginning as BRIDGES and later on as ETIS club - see also the publications and discussions at the MESUDEMO workshop of Rotterdam.

Williams (Presentation) “Role of GTF”. Even if all technical issues were solved, the following topics have to be addressed, worked-out and finally solved:

To establish GTF in the modellers' world user friendly and licence free tools must be available for the ones interested to implement a translator. If translators, data, models and interfaces were available then GTF would help very much to boost research work, decision-making work etc.

Looking at cost-effectiveness, the GTF development will probably be positive only in the long-term as very much must be worked-out.

Who benefits from GTF? EU, policy makers and the research field benefit ultimately! The decision makers will benefit most of the harmonisation for policy testing. The software industry will not benefit, at least not in the short and mid term. The software industry would benefit only in the long term but still there is the question about the size of the market, as cost effectiveness has to be ensured. How does DG TREN evaluate the market? Is the market big enough or rather small?

Who pays for the development and implementation? As the software industry can just benefit on the long run, in the sort-term losses and costs are to be expected. Therefore, it is clear that the industry is reluctant to invest into something that is uncertain. This means, the EU needs to take leadership forcefully and move on with the GTF development until it reaches a state where the industry sees their potential benefit and then are willing to invest time and money.

Further issues to be considered in establishing GTF:

Initial design and implementation: if something goes wrong, GTF will not get a second chance among people (industry, modellers etc.), so this must be done very carefully to be a success.

GTF must be in harmony or at least not in conflict with existing standards.

GTF translators must be cheap and easy to adopt.

There is a need for financial support now (short and mid term), regulatory support (licensing issues etc.) later (mid and long-term).

Concerning ATOM, an analytical web server is installed as test case. It will be analysed with selected SCENES files how to apply GTF and what it takes to transform (translate) the data into GTF structures, i.e. what is involved in applying GTF, cost estimation for full implementation, identification of potential problem areas for implementation, long term reaction?

Houée There is a need of evolution in database models but first we should convince the institutions of the relevance of those models. In addition, one has to explain which procedures to follow to create this standard database model.

Ulied There are already two GIS applications focused in transport analysis which are already operative and validated (TOP and ATMax), based both on a GTF datamodel prototype.

Williams and Martino There is a need to improve on database quality and metadata before improving GTF.

Panagopoulou It is necessary to explain in a formal document why the GTF and what is the reason for its development. GTF is not a Commission priority.

Ulied If EC do not use the GTF to disseminate data, which datamodel will the Commission use?

Martino (Presentation) “A few ideas on GTF (generalised transportation-data format)”.

Five statements line out the question.

The development costs for GTF should be listed and limited.

Any application of a data model must be at the lowest data level. So, focus the GTF efforts at the level of basics.

How can data providers be committed to use GTF?

Nowadays data are not coherent and there are many gaps, e.g. surveys are structured and sampled differently and the focus is not the same.

So how far can we go in the standardisation of data? With GTF, a homogenous base can be started to be developed.

Houée One needs the meta-data on the lowest level to reproduce the real sources.

Nielsen It is better to know about a problem than not knowing it.

Schoch (Presentation) “The IWW European transport model and GTF”.

As a practitioner of receiving data and having to re-format and re-structure it to the needs of the model, a standard like GTF would be good. However, GTF should be defined at the highest level of detail with many examples. Assisting tools for adopting the own system and implementing the translators should be made available.

Ruffert To make clear where the GTF-CM fits in: the "GTF vision" consists of four trails

Software, that’s the GTF-CM, the theory

The data (harmonisation) issues, maybe leading to an ontology

The policy question definitions and the mapping onto GTF-CM and data operations and

Legal / organisational issues.

These were discussed globally in the BRIDGES project. In SPOTLIGHTS-TN, the focus was strongly on the GTF-CM, i.e. the theory side.

Fourth session: ”Common Understanding" on standard transport data models

Mandel (Presentation and working out of text) “Common understanding principles”.

The following text was proposed as discussion basis for a text of ”common understanding" for the transport modelling community and available for download at the web and presented in addition at this workshop:

Memorandum of Understanding for recommendations to the European Commission

The undersigning participating institutions, companies and experts of the spotlightsTN/GTF Workshop held on 11th / 12th October 2001 in Barcelona hereby recommend the following:

1. The European Commission endorses the finalisation of the ”Generalised Transportation-data Format" (GTF v1.0).

2. Subsequently, the European Commission will recognise the necessity to undertake calls for projects to finalise the spotlights GTF Specification (v1.0). Therefore funding will be needed to finalise GTF into an operational format, i.e. for the development of an open source, at least freely available, GTF Reader / Writer library of common functions and API (Application Programme Interface), which can be used by any person, organisation or company to build a complete GTF Translator to the own proprietary software data structures. The European Commission endorses to examine and evaluate the feasibility of moving towards making the GTF specification an operational library of functions along the lines just stated. In total this action also incorporates to provide training, workshops for the implementing institutions / companies as well as on location training support (scientific and technical coaching).

3. The European Commission will submit the ”Generalised Transportation-data Format” (GTF v1.0) to a worldwide standards board, e.g. the European Committee for Standardisation CEN (http://www.cenorm.be/), the International Organisation for Standardisation ISO (http://www.iso.ch) or any other board deemed appropriate by the European Commission.

4. The European Commission further will recommend to its institutions and the member states to support the finalisation of the GTF specification and to take steps to provide data in the GTF format.

5. The European Commission will provide its own data and data from any projects and studies undertaken according to the GTF data model.

6. To streamline, organise and optimise the introduction of the ”Generalised Transportation-data Format” it is recommended that the European Commission establish an advisory board consisting out of scientific, institutional and industrial members. Subsequently this board will work out guidelines for the procedure to establish GTF and will deal with and resolve all administrative and legal matters as well as all questions concerning data provision and transmission rules, etc.

7. Furthermore the European Commission is recommended to foster the dissemination of knowledge on GTF at transport and software development conferences as well as to publish papers on GTF in detail and generally about the GTF vision in appropriate and / or relevant scientific and software development journals.

8. In addition the European Commission is recommended to keep open the GTF forum or Mailinglist as the permanent and standard means of knowledge exchange on all issues of this GTF task. Therefore, the evolution of GTF can take place under consideration of societal and technical development and the open participation of all interested parties. Future projects in or near the domain of the GTF topic will be

recommended to use and to support the standard means of knowledge exchange.

After these recommendations are achieved, the undersigning institutions and companies are positive to consider serious and strong efforts to implement the GTF specification and to add import-export filters to their proprietary software / software packages.

It was stated that it is extremely difficult to formulate a document lining out a win-win situation, which in addition can be signed by all the different institutes in Europe concerned. In the light of the responses gathered out of the WP-leaders point of view, it would be already a big step forward if at least the experts can agree to the MoU and just some institutes from different member states join. Personal contacts and intensive discussions have been already successful so that some experts as well as software industry expressed their interest.

The persons / institutions listed below already signed the mentioned or a short version of the MoU:

Institution/Company	**Name**
ETH Zurich	Prof Nagel
ETH Zurich	Prof Axhausen
Polydrom	Mr de Rham
INRO	Prof Florian
Nestear	Mr Reynaud
Steer Davies Group	Dr Willumsen

The following discussion decided on the fact that such recommendations should focus firstly on the benefits by user type of having a GTF, e.g. benefits for EU, for DG TREN, for national offices, for research field and the software industry, what GTF is, what it is good for, reference to implementations e.g. ATMax, TOP show what GTF can do and then propose an implementation plan.

It was agreed that MKmetric rewrites the text into the direction of recommendations considering the participants comments and circulates it among the participants and the GTF community in form of the web forum and the Mailinglist in order to enhance it and then to formally give it to Anna Panagopoulou as the representative from DG TREN with a letter of intent (LoI) which just states that the undersigning person, institute or company agrees to and backs up the recommendations. Signed LoI's will be handed over as they arrive.

Spots of the discussion:

Houée "Taking action to influence the member states" is a very problematic formulation! Some member states or institutions will surely not like this. Therefore, the formulation must be more policy eloquent.

What should be stated clearly is an exact definition of what GTF is what it is for and what the benefits are. In addition, maybe a different approach to the contents of the text more towards "interoperability of models" might be better. Moreover, to make pilot-test cases to demonstrate that GTF works technically but also that the benefits are obvious for the policy decision maker, e.g. the comparison of results.

Ulied The MoU should contain a list of entities and relationships. That should make things simple.

Williams Leave out "develop software components" because MoU shall promote GTF! Should mention first steps towards standardisation of data. Recommend promotion of data harmonisation / standardisation. The text should make clear the benefits of GTF and the data harmonisation.

Taale I cannot sign this as an institution. Just list the names of experts.

Houée Since we experts are involved in the GTF process our signature will not be an added value. A real step forward would be to get the signatures of institutions. The text should be a few sentences establishing that there are operational implementations of the GTF vision (ATMax, TOP) that benefited from GTF and they are converging to GTF.

So the text should establish

Evidence that GTF works (TOP, ATMax)

Evidence that GTF solves problem of integrating data, models etc. and that one can pool together data from different sources

Mention that GTF is first step to ultimately compare results of models etc.

(Do not say that GTF makes data of different kinds consistent ...)

We deal with data because we use models. Out of the model oriented point of view approach the institutions to encourage harmonisation of data and encourage harmonisation of software products and models. GTF is just one step in the long way of data standardisation.

Burgess For us since our software is flexible it is no problem to change positions in the data and formats of a piece of data.

Panagopoulou The Commission promotes data harmonisation and the use of different data provider. Therefore, one should consider this position in the MoU. One should also structure the argumentation to show the necessity of GTF.

If 10 experts sign then it stays in the books of the EC, because only I would promote GTF. If we want institutions (which is of value-added) then we have to clearly define the scope of GTF.

The text for example could mention the following:

We the institutions recognise that there is a lack of harmonisation in data

We the institutions recognise that there is a lack of harmonisation in software and models

To push research and science GTF is needed

...

Something about: based on the outcomes of the 4th and 5th Framework Programme and how to exploit the results.

And more working-out of the formulations in a formal way, then send it to me and circulate it in 1-2 months time for signature.

Nielsen It also needs a strong statement to open-up (proprietary) software to GTF exchange like the effort undertaken in the GIS world by OpenGIS. There the decision was taken at the management level and not the technical level. Therefore, the incentive is much stronger.

Go back to the beginning, put it e.g. on the web, get comments, and then in the LTV (Long Term Vision) workshop present the new version. The text should address: Why the Common Understanding? Why is there the necessity of harmonisation, reasons for GTF? Show difficulties of data harmonisation.

Ulied Own data model is important (format is not important!).

Panagopoulou ETIS is still in the research phase. Memorandum of Understanding, when corrected as discussed, will be helpful. There will be another thematic network for ETIS (not in 6 months, but...).

Also for example, the text should not be formulated as "the EU calls for projects...". The participants of this workshop should continue discussing GTF and how to promote the idea of signing the next MoU. The group should loop on the formulation of the 'Common Understanding'.

Houée Disseminate the results (e.g. workshops with ministries attending) of GTF but not technical, rather to point out the benefits.

Walker The term "Memorandum of Understanding" (MoU) might have the sense of a (semi-) legal meaning to some people, which is too strict. The formulation "Common Understanding" is better. The text should also address "continuing maintenance and updating" (maybe through an advisory board) of GTF.

Nielsen: Soften the formulations of e.g. "positive to undertake serious and strong efforts" to something less strict.

Logie The wording is very important.

Panagopoulou What is missing is promoting standardisation. Moreover, there is no need for any sort of time schedule. Better just "to indicate the progress...".

Walker Another weaker formulation would be "... seriously considering doing..." or "... positive to consider serious and strong efforts...".

Panagopoulou Purpose of the whole exercise is to reach a DG TREN information system (with automatic translation of data etc.). Providers, who will want to participate, will have to implement translators etc. therefore; they will not need to sign the MoU.

Taale The argumentation line must be the strengths of GTF. Take findings of yesterday's discussions and make the recommendations as projects.

Panagopoulou A letter of recommendation in the GTF final report, formulated differently than the current MoU, would be good.

Mandel The MoU in the presented version was a suggestion for discussion. It was a long time on the web forum and it was disseminated to all on the Mailinglist. Now we are happy to receive such a lot of comments and enrichments at the workshop, but please keep going to forward any other idea or formulation to us. Consider that these recommendations should not be seen as exclusive for the EC but EC plus Industry and experts. We will rewrite the 'Common Understanding' considering your ideas and let it circulate among the interested GTF community to finalise a document, which then can be distributed to institutions concerned. We will also come back upon you to suggest institutions, experts and industry.

Fifth session: "GTF in prospective"

Walker (Presentation) "Conceptual scheme of a decision support system: goals, scenarios, policies, and outputs". It is important to distinguish between things we can influence and the ones we cannot. Therefore, we separate policy and exogenous impacts as scenarios. Policy has to be tested not scenarios.

Van der Loop Are scenarios the same as external variables or factors? -> Yes.

Ruffert Sometimes policy changes are often changeable and uncontrolled.

Burgess (Presentation) "The European Transport Model Directory (MDir) Analysis of MDir relevant for GTF". Explains MDir research progress: 222 models collected and analysed.

Panagopoulou It should be interesting to identify the gaps of the models in the EU countries not just to count the models of different type of them (referring to MDir investigation). So it is of interest to know what kind of models are available and what is missing, e.g. what kind of policy question can be answered and what is not addressed. Check also EC-projects on metadata in the programme information society and technology.

Nielsen Insist on the relevant importance to fill in consciously the survey of MDir. One can also use XML tags on websites as search element to create a kind of search engine.

Ulied and Cañas (Presentation) "Long-term visions for e-government the European Transport policy-support system (ETIS)". The Semantic Web (SW) is a new way of Web content that is meaningful for computers instead than to people, and is expected to unleash a new wave of services and applications in the coming years. The GRID is a next generation Internet.

Ruffert (Presentation) "GTF detailed description".

Taking-up the concepts presented by *Ulied and Cañas*, and to make things clear regarding this presentation, XML = structure of semantics, e.g. Document = Title + Subtitle + Author + (Chapter*), i.e. a document consists of a title, a subtitle, the author and a number of chapters. The structure is defined in Document Type Definitions (DTD) or derivatives from this concept, e.g. RDF etc. The purpose of XML is to add "meaning" to "data" thus creating "information". Only information is really useful and what ultimately the decision-maker wants. Nowadays as consequent follow-up, the talk is of "ontology". An "ontology" is "an agreement on the account of a shared understanding of a problem domain". This is for example, a list of definitions of terms used in the problem domain, e.g. the transportation field, agreed upon by the community in the problem domain. One of the GTF work is to capture the concepts and information dealt with in the problem domain, i.e. make a list of definitions of terms. Later this can be the basis for a formal description, i.e. an ontology.

The GTF-CM was presented in detail. In the discussion it was agreed to promote the classes that generate demand to toplevel classes since many modellers would be confused to see a GTF-CM thinking it does not have any demand generating classes, although conceptually this change is neither theoretically necessary nor logical. In addition, the name "TransportProduction" class will be changed to "Factor" class (like in previous versions of the specification). Concerning the Zone definition, it should state that Zone structures on one layer do not overlap, i.e. Zones on the same layer are disjunct. A Zone can come down to a point at the highest level of detail. In a final effort, Ulied raised again the question to change the word "Terminator" but as all other participants disagreed there was consensus not to change it.

The presented ad hoc XML format –only developed for making examples- was discussed. It was agreed that once the GTF-CM is finalised an in-detail study of which format to use is needed, since XML all though very flexible and nice, it adds huge amounts of additional text/data to the raw data. For the huge sizes of e.g. model result files, this would make them unnecessarily large. The name "GTFObject" should be changed to "GTFClass". It was also mentioned that high-level classes should contain a GIS element. This is already considered due to the principle structure of the object definition. One should also take care of different levels of data. This is already considered by the fact that objects can refer to itself to split or break down information.

Finally, it was stated that human readability is obsolete if translators are used and one follows the argumentation towards GTF consequently. It was agreed that this requirement can be dropped but it was also recognised that it has advantages if machine code is direct and easily readable and can be checked by humans. At least in the start up phase where always unforeseen situations occur and must be handled fast and effective in worst cases. As last comment, it was stated that GTF should also be made useable for microsimulations. As standards are always under revision one can consider this step in the forthcoming update later on as the principle GTF bases on is dynamic and adaptable. (Dynamic modelling is possible with the current GTF Specification, since all objects can be associated with Date objects thus allowing for time-stamping objects.)

Sixth session: "Summary of workshop"

Last statements from the workshop participants:

Nielsen All the discussions and presentations showed the necessity of GTF. There was almost an agreement on MoU (no disagreement of the idea of the MoU, only change the wording to Common Understanding and a re-formulation is needed). Rewrite the recommendations (focused to institutions) and send it to the participants, discuss the level of complexity of GTF and the implementation and a glossary agreement.

At a certain point, one has to stop the specification and one must go on to the implementation. If GTF works out there should be the EU financial support for the development cost as the benefits for the policy issues are pointed out and the benefits to modellers should be discussed. The cost discussion is another issue, which should be lined out, in another context. Also important to be clarified are the legal and licence issues.

GTF is technically feasible as other activities in other sectors show. Now one has to go forward from research to development, one can make GTF workable for the transport sector.

Walker DCode, MDir and GTF have to be brought together in the LTV (Long Term Vision).

Burgess Flexible software can adopt easily to GTF so that is not a main problem. We see benefits from GTF.

Taale Very good initiatives. In The Netherlands, this was also tried. We will see if we can use GTF for our models.

Logie Start-up work has been done. Now take models and adopt GTF to them. To develop software, it is cheaper to be precise than general. Keep up incentives so that GTF stays general.

Jiang Very interesting for a modeller. Maybe modellers work too specific so that they do not need GTF. Often we collect our own data and it will take a lot of time to transfer it. Therefore, aid is needed and would be very helpful. (*Ruffert*: Software will be available for translation purposes. There must be tools or a library of functions – developed and financed by the EC - so that modellers have the incentive to add specific routines for translating their proprietary data using the library to read/write GTF files etc.)

Schoch It will be a hard time for all modellers to implement GTF, but it is the right way to exchange data. We will solve many problems, increase transparency and boost research.

Martino GTF is a good solution, now one has to apply it. Problems with data providers have to be solved. GTF can be the first step in the process of data harmonisation on an institutional level. In addition, the GTF market value has to be explored. Who is using GTF? Who is benefiting most? Technically all of GTF is possible.

Williams As original partner in BRIDGES, I am impressed by the progress of the technical work. The GTF issues are a matter of urgency. We need half a page on the expected benefits for the marketing of GTF and additional material so that GTF can be "sold". GTF in practice needs to have a parallel initiative to harmonise data (the input to models).

Panagopoulou Thank you to all participants. I agree we need as next steps: application, pilot test case, how to use it or a kind of equal system. Initial user is the European Commission – so we need data from other member states. If the system is successful, we will promote it in the member states.

Ulied GTF is a beautiful possibility to transfer knowledge, too. Filling MDir is an experience for modellers to express what they do. GTF will be an ontology in the end. In the long term, ontologies will be interchanged instead of developing new formats. Use GTF. GIS should be considered more explicitly in GTF not only with a "pointer in GTFObject". Long term vision: GTF may have a big impact. Organisation of institutional aspects is needed. We need help and support from the EC (financial and organisational) and further projects.

Ruffert On the specific development steps for GTF:

"From conceptual model" to "data model", i.e. the GTF-CM has to reach the next phase, design and implementation of a specific data model,

"From common agreement" to "ontology", i.e. the "common agreement" should be used as a basis to develop a glossary (mid term) and then an ontology (long term) of knowledge in the problem domain of transportation modelling,

"Library of functions", i.e. the EU should finance the development of a freely available library of functions e.g. reading/writing functions for GTF files, which can be used by potential implementers, thus reducing their costs

"Standardisation" GTF should be applied to a standardisation board to make it a standard at least European wide.

Mandel Summary of the next SPOTLIGHTS TN actions:

LTV-workshop and the final conference will take place in February 2002. This event will be co-ordinated with Think-up and ATOM as results of all TN’s should be presented and as these results will be used by ETIS-LINK in 2002 as starting point. The participants should be a wide range of experts, institutions and software industry.

The GTF worktask will continue to finalise the deliverables D6, 7 and 13 within the given project schedule. The Common Understanding will be reformulated and distributed for comments and enrichments to the GTF workshop participants. The last refinement of the GTF, specification will be undertaken based on the workshop discussion. A presentation will be prepared for the final conference.

Thank you very much for your participation at our GTF-workshop and all the interesting discussions and comments, which will be considered for sure in, the further work. Due to your help, this was a productive and successful workshop. Soon you will receive the new Common Understanding for comments and enrichments. Please also suggest possible experts, institutions and software companies to which we can direct the Common Understanding. As soon as possible, we will also make the updated GTF documents ready for downloading. Have a good and save trip home.

2.14. Participants Day 1

Prof Gaudry and Mr Koukoutsis were excused.

11th

WS_PresenceList.xls

Tabelle1

COMPANY / INSTITUTION	NAME	Attended
AJD (Agora Jules Dupuis), Montreal	Prof Marc Gaudry	
AVV	Mr Han van der Loop	
DG TREN	Mrs Anna Panagopoulou	
East Denmark Model	CTT/ Prof Otto A. Nielsen (DTU)	
IWW Institut für Wirtschaftspolitik und –forschung Universität Karlsruhe	Mr Michael Schoch	
MCRIT Ltd Software Research and Planning Consultancy	Dr A. Ulied	
MEPLAN	Mr Ian Williams	
Minerva	Mr Miles Logie	
Ministry of Transport AVV	Mr Henk Taale	
MKmetric GmbH	Dr Benedikt Mandel	
MKmetric GmbH	Mr Eduard Ruffert	
National Technical University of Athens (NTUA) Department of Electrical and Computer Engineering Iroon	Mr Elias Koukoutsis	
NEAC	Mr Arnaud Burgess	
NESTEAR	Mr Fei Jiang	
SES	Mr Michel Houee	
TRT Trasporti e Territorio srl	Mr Angelo Martino	
EUROPEAN INVESTMENT BANK	Mateu TURRÓ	
RAND Europe	Dr. Warren Walker	
MCRIT	MERITXELL FONT	
MCRIT	ANDREU ULIED	

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WS_PresenceList.xls Tabelle1

CATALAN GOVERNMENT	Xavier Baulies
INSTITUT D'ESTUDIS TERRITORIALS	David Rosell
METROPOLITAN TRANSPORT AUTHORITY (ATM)	CARME FABREGAS
CARTOGRAPHIC INSTITUTE OF CATALONIA (ICC)	ANNA LLEOPART
CARTOGRAPHIC INSTITUTE OF CATALONIA (ICC)	CARLES SERRA
Intergraph Spain	Josep Fornons

MKmetric GmbH 2/2 28.09.01

2.15. Participants Day 2

Prof Gaudry and Mr Koukoutsis were excused.

12 th WS_PresenceList.xls Tabelle1

COMPANY / INSTITUTION	NAME	Attended
AJD (Agora Jules Dupuis), Montreal	Prof Marc Gaudry	
AVV	Mr Han van der Loop	
DG TREN	Mrs Anna Panagopoulou	
East Denmark Model	Prof Otto A. Nielsen (DTU)	
IWW Institut für Wirtschaftspolitik und –forschung Universität Karlsruhe	Mr Michael Schoch	Michael Schoch
MCRIT Ltd Software Research and Planning Consultancy	Dr A. Ulied	
MEPLAN	**Mr Ian Williams**	Ian Williams
Minerva	Mr Miles Logie	M. Logie
Ministry of Transport AVV	Mr Henk Taale	
MKmetric GmbH	Dr Benedikt Mandel	
MKmetric GmbH	Mr Eduard Ruffert	E. Ruffert
National Technical University of Athens (NTUA) Department of Electrical and Computer Engineering Iroon	Mr Elias Koukoutsis	
NEAC	Mr Arnaud Burgess	
NESTEAR	Mr Fei Jiang	
SES	**Mr Michel Houee**	
TRT Trasporti e Territorio srl	**Mr Angelo Martino**	Angelo Martino
Mcrit	Mr Enric Ceñas	
Mcrit	Meritxell Font Bou	
Mcrit	Andrew Esquius	
RAND Europe	Warren Walker	Warren Walker

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2.16. Signed MoUs

ETH Zurich – Prof Nagel

MKmetric Gesellschaft für Systemplanung mbH

Karlsruhe, 19. September 2001

Memorandum of Understanding (Short version)

The undersigning company / expert not taking part at the spotlightsTN/GTF Workshop held on 11th October 2001 in Barcelona hereby recommends the following:

In the case of the European Commission (EC) taking steps to further develop GTF and to support the vision of GTF, the undersigning is positive to further participate in the development of GTF with comments, opinions and, depending on whether projects are called for by the EC for this task, e.g. to specify a GTF at an implementation level, to presumably and actively participate in such a project.

I hereby agree to the terms stated above.

ETH Zürich, 11 Oct 2001

Nagel

Prof Nagel

Institut für
Wissenschaftliches Rechnen
Eidg. Techn. Hochschule Zürich
ETH-Zentrum
CH-8092 Zürich

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HRB 6483 * Gerichtsstand: Karlsruhe * Geschäftsführung: Dr. B. Mandel

ETH Zurich – Prof Axhausen

MKmetric Gesellschaft für Systemplanung mbH

Karlsruhe, 18. September 2001

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ETH Zürich, IVT,

Prof Kay Axhausen

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GESAMT S.05

Polydrom – de Rham

20-09-01 11:22 DE: A:00497219616099 PAGE:01

18-09-2001 11:50 MKmetric GmbH Karlsruhe +49 721 9616099 S.03

MKmetric Gesellschaft für Systemplanung mbH

Karlsruhe, 18. September 2001

Memorandum of Understanding (Long version)

The undersigning company / expert not taking part at the spotlightsTN/GTF Workshop held on 11th October 2001 in Barcelona hereby recommends the following:

1. The European Commission agrees to use the Generalised Transportation data Format (GTF) specification after it is finalised (v1.0, see 2.) and provide its data in the GTF format.

2. Funding will be needed to finalise GTF into an operational format, i.e. for the development of an open source, at least freely available, GTF Reader / Writer library of common functions. Which can be used by any person, organisation or company to build a complete GTF Translator to the own proprietary software data structures.

3. After this is achieved, the undersigning institutions and companies are positive to undertake efforts to implement the GTF Specification and to add import-export filters to their proprietary software / software packages.

4. To support this development, the European Commission will provide training workshops for the implementing institutions / companies as well as on location training support.

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18-09-2001 11:51 MKmetric GmbH Karlsruhe +49 721 9616099 S.04

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5. The European Commission will undertake the efforts to finalise the Spotlights GTF Specification (v1.0) and to submit it to a world wide standards board, e.g. European Committee for Standardisation CEN (http://www.cenorm.be/) or International Organisation for Standardisation ISO (http://ww.iso.ch).

6. The European Commission will keep the GTF web discussion forum or the GTF Mailinglist open as the permanent standard means of knowledge exchange, so that the evolution of GTF can take place under consideration of societal and technical development and the open participation of all interested parties.

I hereby agree to the terms stated above.

Monaco, 20.09.2001 Casimir de Rham

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HRB 6483 • Gerichtsstand: Karlsruhe • Geschäftsführung: Dr. B. Mandel

And the short version:

20-09-01 11:24 DE: A:00497219616099 PAGE:03
18-09-2001 11:52 MKmetric GmbH Karlsruhe +49 721 9616099 S.05

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HRB 6483 * Gerichtsstand: Karlsruhe * Geschäftsführung: Dr. B. Mandel

INRO – Prof Florian

LES CONSEILLERS INRO CONSULTANTS INC.

5160 Décarie Boulevard, Suite 610, Montréal (Québec) Canada H3X 2H9
Tel.: (514) 369-2023 Fax: (514) 369-2026 Web: http://www.inro.ca/
Admin. Email: sales@inro.ca Tech. Email: support@inro.ca

Memorandum of Understanding

To Whom it May Concern:

Since no representative of our company can attend the spotlights TN/GTF workshop to be held on October 11, 2001 in Barcelona, we agree to the following:

In the case that the European Commission (EC) will take further steps to develop GTF and to support the vision of GTF, we are willing to follow the development of GTF and provide comments, views, and opinions. If projects are called for by the EC for this task that will specify a GTF at an implementation level, we would be willing to actively participate, provided that the appropriate funds are made available.

Michael Florian, Dr.Eng.Sc.
President

Nestear – Mr Reynaud

Fax emis par : INRETS ARCUEIL 21/09/01 15:24 Pg:

Nestear

Paris, September 21st 2001

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I hereby agree to the terms stated above.

The Director of NESTEAR

Christian REYNAUD

99bis, Avenue du Général Leclerc
75014 PARIS
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Tél : 06 22 57 04 36 - Fax : 33 1 40 44 71 23

Steer Davies Group – Dr Willumsen

19-SEP-2001 10:43 FROM STEER DAVIES GLEAVE TO 900497219616099 P.02/04

MKmetric Gesellschaft für Systemplanung mbH Karlsruhe, 18. September 2001

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Karlsruhe, 18. September 2001

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SDG,

Dr Luis Willumsen

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TOTAL P.04

3. CONCLUSIONS AND OUTLOOK

The main result from the workshop is the discussion of the recommendations to the European Commission and the drafting-up (afterwards) and discussion of the text.

The workshop and the recommendations from the experts of the GTF workshop clearly establish and show

1. the need for harmonisation of data and transportation models' input/output structures.
2. that the GTF Specification effort is important.
3. that the GTF Specification, that was presented, is a very good first step towards harmonisation.
4. that harmonisation in this area is feasible.
5. that the GTF effort is a matter of urgency.

Furthermore, the recommendations clearly show

1. the benefits to be gained from the harmonisation effort by user group, e.g. decision makers, planners, analysts, transport researchers and software companies.
2. a road map towards implementation of the GTF Specification.
3. a road map for further work along the lines of the GTF effort and the "GTF vision".

The work contacting software companies to participate in the GTF effort of the spotlightsTN showed clearly that these are reluctant to invest time and effort as long as it is not clear whether the European Commission will support GTF. The reasons for this lie in the fact that the benefits and gains for the software companies will only be achieved if and only if the European Commission endorses and strongly supports the GTF efforts and the "GTF vision". This in turn is because GTF is a "middle-ware" effort in the area of transportation modelling and neither a "backend" nor "frontend" software effort, which are of course easier to sell and make a profit from.

All in all, it can be stated that, looking into the future, if the recommendations are endorsed by the European Commission and the GTF effort is strongly supported, then and only then significant gains can be achieved. It would be a serious mistake if the BRIGES and spotlightsTN projects were seen as the end of the GTF effort rather than the beginning. The next steps (also according to the recommendations) the focus must shift towards finalisation and then implementation of the GTF Specification.

ANNEX: AVV (VAN DER LOOP) TRANSPORT POLICY SYSTEMS IN THE NETHERLANDS

Topic area code:

H1

Paper Number:

8102

Authors:

Han van der Loop, AVV Transport Research Centre
of the Ministry of Transport, Public Works and Water Management, The Netherlands
and
Maarten Mulder, Directorate for Strategy and Coordination
of the Ministry of Transport, Public Works and Water Management, The Netherlands.

Title:

"To Measure = To Know": Results of a Transport Policy Monitoring System in the Netherlands

Abstract

In the Netherlands a new monitoring system for national transport policy has been developed and applied since 1992. This system for planning and evaluating transport policy, named "To Measure = To Know", has been developed as a part of the national Second Transport Structure Plan, SVV-II, 1990-2010.

A first essential element of this system is that clear and unambiguous (preferably quantitative) objectives were identified for a horizon year, e.g. a maximum level of emissions of CO_2 by motor vehicles in 2010, a maximum number of road casualties, a certain level of freight transport and a level of congestion probability on the trunk road network. Next, policy measures were formulated and forecasts were made.

A second essential step was that progress in attaining the objectives was assessed each year and reported to the government. The effects of the policy measures which were implemented were also identified. On the basis of the progress made, policy measures were adjusted, new measures introduced and forecasts adjusted.

In the paper and presentation we will describe the transport policy monitoring method, the results over the last 10 years and current developments.

Key words: Monitoring, Policy evaluation, Transport policy, Transport planning

Method of Presentation: Over Head Projector

Topic area code: H1

”To Measure = To Know”: Results of a Transport Policy Monitoring System in the Netherlands

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1. INTRODUCTION

A system for monitoring national transport has been developed and applied in the Netherlands from 1992 until now. This monitoring system has been developed as a part of the national long-term policy plan (Ministry of Transport, Second Transport Structure Plan, SVV-II, 1990). This plan included many measures dealing with the accessibility of urban areas, safety and the environment. In this plan ambitious targets had been formulated which should be reached by a comprehensive set of measures from which a large number still had to be developed or applied for the first time. A monitoring system should make it possible to adjust the measures in case the targets were not reached. Therefore the monitoring system ”to measure is to know” was developed.

In this paper the context of policy evaluation in the Netherlands will first be presented. Secondly, the monitoring system’s methodology will be described. Thirdly, the resulting monitoring system for the long-term policy plan (SVV-II) will be described. Finally, conclusions will be formulated.

2. EX POST EVALUATION OF TRANSPORT POLICY IN THE NETHERLANDS

The practice of monitoring and ex post policy evaluation in the Netherlands has evolved since 1970 from incidental examples of ex post evaluations of separate projects through courses, publications and practical experiences to a new structure for the budget cycle of central government at the moment in 2000. Round about 1970 a Commission advising the Ministry of Finance proposed to use policy analysis techniques to make it possible to take policy decisions on the basis of rational considerations and objective information. Techniques for ex ante and ex post evaluations were developed and applied. Courses and publications led to growing interest, but also to scepticism. Doubts are concentrated in particular on the political will to base decisions on rational arguments. In the Netherlands the political culture can be characterised as a ”consensus society”. Not only all political parties representing a substantial part of the population, but also social organisations influence political decisions in their interest and should recognise themselves in the decisions taken. In this culture a strong interest in evaluation resulted in many ex-ante evaluations of plans as well as projects. Political parties showed an increasing interest in monitoring social problems and phenomena. Also, many ex post evaluations of projects were executed. The results of the ex ante studies were used in decision-making by public authorities. The results of ex post evaluations appeared to be more difficult to cope with. A study at the Ministry of Transport suggests that a kind of ”learning process” develops, which influences new projects and new decisions in an invisible, implicit way (AVV Transport Research Centre, 1999b).

3. "TO MEASURE IS TO KNOW": DESCRIPTION OF THE SYSTEM FOR MONITORING

3.1 The Policy Cycle

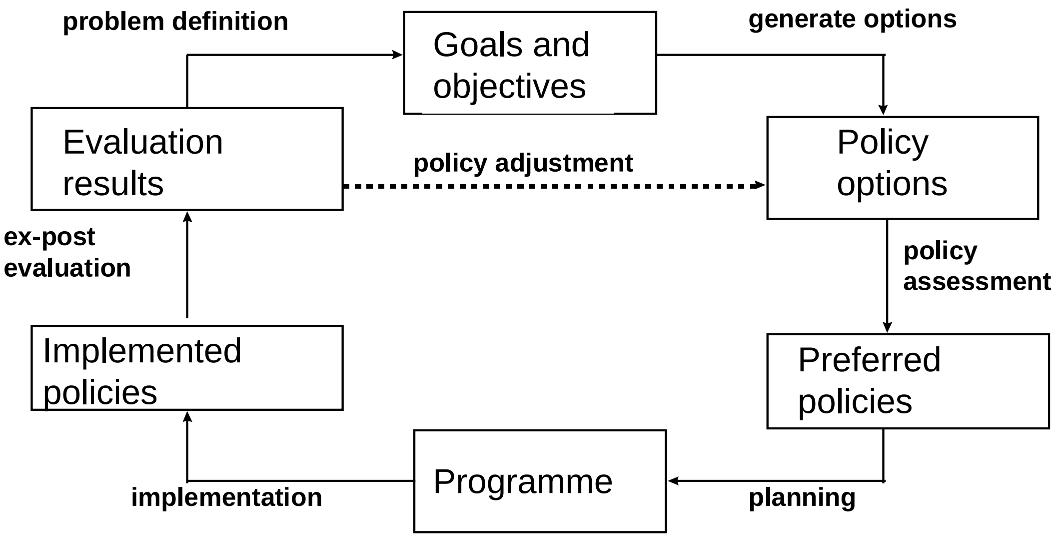

Figure 1. The policy cycle

Starting point for monitoring is the "policy cycle". Figure 1 shows that the starting point in policy formulation is to recognise and became aware of problems which are considered as serious and should be solved or avoided. E.g. to maintain a certain level of transport connections and accessibility, the occurrence or expectation of environmental damage because of transport or lack of safety in transport. If problems are envisaged, certain objectives of policy can be formulated, e.g. certain levels of accessibility to economic centres, emissions or accidents occurring at a certain time in the future. E.g. in SVV-II, the Dutch policy plan of 1990, one of these objectives was a maximum level of emissions of CO2 to be reached in 2010. In the following steps of the policy circle policy instruments or measures are developed, determined and programmed. To make the step from policy options to preferred policies, techniques for ex ante evaluation of policy options play an important role. In order to decide about the measures to be taken, a number of techniques can of course be used to compare alternative solutions: e.g. planning studies, cost-effectiveness studies, etc. A condition to apply techniques for ex ante evaluation is that it has to be made explicit which measures are planned, what their characteristics and intensities are, what their function is. If this condition has been fulfilled, techniques for ex ante evaluation can demonstrate which results are expected from policy measures: a forecast which indicates whether the objectives will be reached.

In a further step, the chosen measures are implemented. The final step is the evaluation: have the objectives been reached, the problems been solved and what is the effect of the measures introduced? The

results can provide a reason to adjust the policy objectives or to adjust the measures decided upon, e.g. to intensify the measures. And the cycle will be followed again. This cycle describes the policy process in a rational, logical way. In reality, the steps are in many cases implicit rather than explicit.
The method ”to measure is to know” implies that the steps are not only made explicit, but concrete and quantified as well. The assumption is that certain objective information makes it possible to manage the policy process more effectively. To do this, knowledge about policy processes and methodological concepts and techniques are used in a practical way. The purpose of this method is that problems can be solved better and that available means are used more effectively. Another characteristic of this method is that it concerns a plan with many objectives and many measures, and not only one project with one measure and one or more objectives.

3.2 Management of the Policy Process

Before describing the various steps involved in measuring in detail, the stages in the management of the policy process are described in more detail. A distinction can be made between taking decisions about budgets based on input, output and outcome. Input refers to the financial means, output to the realised measures and outcome to the changes in society brought about by the measures actually implemented. Management by central government is traditionally based on input which implies that a certain budget can be used for certain measures directed at transport purposes. An example of management based on output can be the number of cells in prisons decided about in the Dutch parliament or decisions taken about the building of certain new roads or railways. These decisions determine the budget necessary to realise these measures. The effects on criminal behaviour or other effects are not indicated and/or do not play a major role in the decision-making process. Management based on outcome focuses on the effects a policy measure is expected to have on the achievement of policy objectives. E.g. the building of new roads can be compared in effectiveness with alternative measures such as incident management. The expected effects on the accessibility of given locations can serve as a basis to take decisions. The main concepts of this process and the relationships between them are represented in Figure 2. This figure not only describes the policy process (as figure 1), but also how management and information are related with this policy process. The purpose of the method ”to measure is to know” is that information about input, output and outcomes can be used as a basis to direct and manage the policy process. This information can also play a role in accountability and in communication about the policy process with the persons and organisations involved. In the next section the role of the method ”to measure is to know” in the various phases of the policy process is described in more detail.

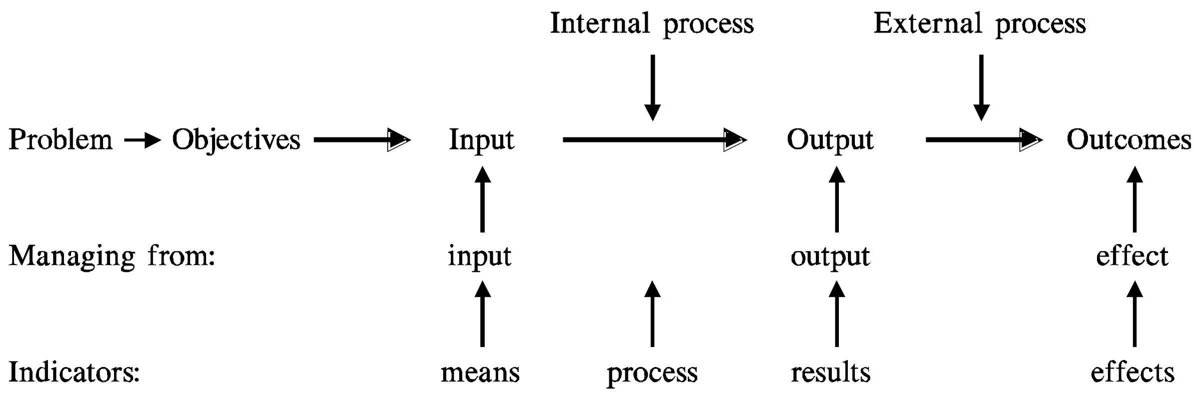

Figure 2. Managing the policy process on the basis of information.

3.3 The technique of ”To Measure is To Know”

The method of ”To Measure is To Know” can be described in terms of the following steps to be taken (AVV Transport Research Centre, De theorie van Meten = Weten, 1998a):
formulating objectives of policy,
identification and definition of indicators,
measuring
making a forecast,
explaining
drawing conclusions and
(eventually) adjusting the course (which indicates the expected development in the indicator assuming that the formulated policy will be completely carried out).
The prerequisites for carrying out these steps are described in this section. In the following section, we will describe how these requirements are met in monitoring the Dutch policy plan SVVII since 1992.

1. Formulating objectives of policy
A first characteristic of the method ”to measure is to know” is that policy objectives are formulated in a clear, understandable, unambiguous way and in quantitative terms (in case of qualitative indicators it should be made explicit how unambiguous and objective, measurable data could be used). Also, it should be possible to translate any policy objective into an indicator which has to meet certain requirements (see next section). Objectives consisting of a combination of two or more variables to be influenced by policy should be avoided. Also a time scale has to be given indicating the present situation of the objective as well as the level which can be reached through the implementation of all the planned policy measures. To apply this approach by central government, it is also required that the policy objectives be approved by the parliament.

2. Identification and definition of indicators

Indicators serve as a kind of thermometer indicating to what extent the policy objective has been reached. Selection and definition of indicators require a very careful approach. Indicators should meet the following criteria: representative for the policy objective, preferably quantifiable (in case of qualitative indicators it should be noted how unambiguous and objective data could be used), measurable (it should be possible to acquire data in a systematic way which are reliable, accurate and continuously available now and in the future), unambiguous (which requires clear, explicit definitions), clear and understandable (therefore definitions and variables should be as simple as possible), to be reproduced every year (e.g. by making appointments with the CBS, the Central Bureau for Statistics) and it should be possible to make forecasts of the indicator for the future (under the - theoretical - condition that no other policy measures should be taken during the same? period as well as under the condition that policy as formulated in the policy plan should be implemented during the same period). This last requirement usually implies that a model is available which describes the complex patterns underlying the social phenomena to be influenced by policy.

3. Measuring.

Depending of the kind of variable this step requires a more simple or more complicated organisation. It implies that appointments are made about the exact variable and definition with local experts, technical experts or with people engaged in data collection about such things as accuracy, equipment (e.g. air quality), times, locations and frequencies of measurement and costs of measurement.

4. Making a forecast.

By making forecasts for each indicator, the policy processes can be followed and managed in a rational way and based on the basis of empirical, scientific knowledge. Making forecasts requires much scientific effort. Explaining factors should be identified, defined and measured. New developments have to be dealt with. Models should be developed and tested. A model which has a central function in national transport policy in the Netherlands to make mobility forecasts is the Dutch National Model System (NMS). With this disaggregate model trips are simulated based on baseyear data about roads, public transport services and locations of housing and working. The forecasts are made based on demographic developments, national and regional spatial developments and developments in the transport system. Other models are often used in combination with the NMS (e.g. to make forecasts of emissions of noxious substances). Long term forecasts made in succeeding years during the period of a strategic transport plan (usually comprising 20 or 30 years) should be comparable to each other in order to be able to make policy development and management in a systematic way. Otherwise forecasts would change every year, depending more on the method used than on new developments.

By making forecasts with or without several possible policy measures and combinations, the impact of a policy programme can be assessed and a suitable programme can be selected (at the preliminary stage of such a programme as well as later when adaptation may be required). To be able to make forecasts, it is necessary to spell out which policy measures are planned, and what their characteristics and intensities are. On the basis of the forecasted effects of a policy programme a course can be charted which indicates the progress of the indicator to be expected in reaching the policy objectives during the years of the policy programme. So, apart from the policy objectives at the end of the period, intermediate objectives or targets can be assessed.

5. Explanation.

After the formulation and implementation of a policy plan, the question arises whether the objectives will be reached, whether the policy measures have the expected effects and whether other external developments than expected at the launch of the policy plan influence policy objectives. To answer this question data are gathered about indicators and ex post evaluation studies are carried out. In the Netherlands, many evaluation studies of separate projects or policy measures have been carried out between1986 and 2000. In case we are dealing with monitoring and evaluation of policy plans as we are doing here, a problem is that not all policy measures and all external developments are identified and evaluated. But, to be perfect in this respect appears to be nearly impossible. Too many data would be required to describe and explain all developments. Also, these would be available rather late, perhaps too late to adjust the policy programme. Therefore it is suggested to make use of all data which are available on indicators for policy objectives and for external developments, to make use of all ex post evaluation studies which have been carried out, to make use of an "effect matrix" schematising all effects and to start in a way as simple as possible. E.g. expert judgements could be used to fill knowledge gaps. In the long run methodology to explain policy effects should be developed continuously.

A first step is how to structure the different kinds of information which are necessary to explain the outcomes of policy plans. This structure is represented in the explanation matrix as shown in Figure 3. A next step, of course, is to fill this matrix in several policy fields.

Influencing factors	Indicator of output and	Knowledge of the causal relation effect Outcome2	Objectives: Outcome 1	measure
External factor 1 x	....	x	x	
External factor n x	....	x	x	
Measure 1	x	....	x	
Measure 2	x	....	x	x
Measure n	x	....	x	x

Total effects			x	x

Figure 3. Explanation matrix of policy effects.

The matrix with effects can show which development has occurred in the indicators of policy objectives (last column) (e.g. a CO2 reduction of 10%). On the other hand (the input), the external factors which actually had an impact and the policy measures which have been implemented can be summarised in the column at the left side. In between these two columns, the most difficult part can be filled gradually. Knowledge about the effects of policy measures will grow when more ex post evaluation studies have been carried out. With this knowledge the effects of policy measures as well as external factors can be calculated. E.g. the CO2 reduction of 10% can be explained as partly an effect of policy measures (e.g. in total minus 30%) and an effect of external factors (e.g. in total plus 20%), which can be shown in the two columns on the right.

The filling up of this matrix should make it possible to learn from the efforts to attain the required policy objectives with the planned measures. And it can give feedback to policy-makers about how to go further. It will not be possible to fill up this matrix immediately. Thanks to increasing knowledge, this matrix could gradually be made more complete and more reliable.

6. Drawing conclusions.
During the implementation of the policy programme, it should be concluded whether the planned policy objectives will be attained or not and whether the objectives and/or the planned measures should be revised.

7. Course adjustment .
If, during the implementation of the policy programme, there are serious reasons to expect that the course of events will be different from the original plan, the course should be adjusted, since it has the function of indicating the extent to which policy objectives will be attained with the actual policy programme.

4. ”TO MEASURE IS TO KNOW”: THE DUTCH POLICY PLAN SVV-II

4.1 Formulating Policy Objectives

In the Dutch transport policy plan SVV-II, several concrete policy objectives to be reached in the period 1986 - 2010 have been set. Some of these objectives are summarised in Table 1. For some objectives of SVV-II intermediate targets were also set and forecasts were made as will be illustrated further.

Table 1. Transport policy objectives in SVV-II to be reached between 1986 and 2010.

Maximum growth in passenger car-km.			+35%
NOx emission by cars			-75%
CO2 emission by road traffic			-10%
Fatal traffic casualties			-50%
People injured by traffic accident and hospitalised			-40%
Maximum probability of being confronted with congestion on the			
trunk road network:	- on main roads to other countries	2%	
	- on other roads	5%	

Working with policy evaluation, it appears that policy measures are related to each other (e.g. if the number of car miles increases, CO_2 emissions increase as well) and that policy measures are influencing policy objectives directly and indirectly in a complex way. To deal with such interdependencies, recently some studies were done on a regional scale as well as on a national scale. E.g. in a national study a framework has been developed which relates all policy measures directed at traffic safety with all policy objectives in the field of traffic safety (Traffic Test, 2000). The result is a causal network describing the relationships between measures and objectives as hypothetical relations which can be tested in subsequent steps. Also, the new budget system to be introduced in the Netherlands from 2002, requires that policy objectives will be formulate in such a way that the attainment of these objectives can be assessed. A monitoring system is required that will comply with the demands of controlling agencies (General Auditor; the new budget system of the Ministry of Finance) and Parliament (the Planning Act, which requires the Minister to report about the progress in policy management). Therefore preparations are carried out to formulate policy objectives of the Ministry of Transport in the fields of transport, telecommunication and water management.

4.2 The Policy Effect Report

To assess what progress has been made in the development and implementation of policy, every year since 1992 a so-called "Policy Effect Report" has been made by the Dutch Ministry of Transport (Ministry of Transport, 2000). This Policy Effect Report is based on the process of policy planning and evaluation as described above. A central item in this report are the graphs summarising all relevant quantitative information about one policy objective in one figure. As an example, a graph on CO_2 emissions is presented (Figure 4). The policy objective of the maximum CO_2 emission in 2010 as formulated in SVV-II is indicated as well as intermediate objectives. Further a forecast made in SVV-II for 2010 if no transport policy would have been introduced, is presented. Also a forecast of the effect of the policy plan as formulated in 1999 is given. Some relevant information has been added in the report. E.g. that an international agreement has been made implying that the total emission of CO_2 in the Netherlands will be reduced by 6% between 2008 and 2012 in comparison with 1990.

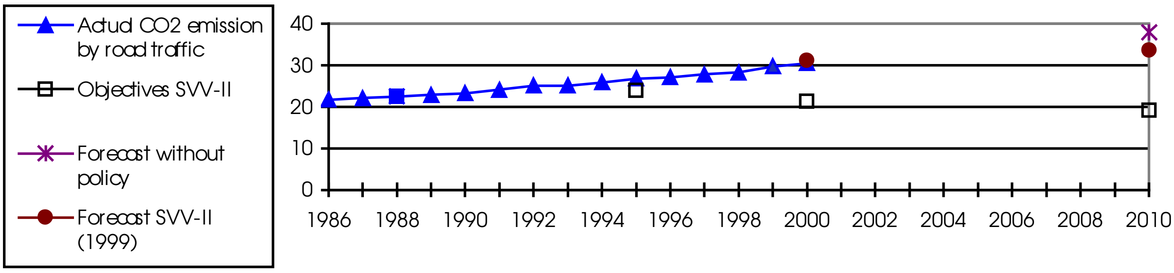

Figure 4. Development of CO2 emissions through transport in the Netherlands (x 1000 kiloton; 1999 is a preliminary figure).

In this Policy Effect Report, for each policy objective, the following subjects are dealt with:
- a description of the policy objective (and intermediate objectives),
- a definition of the indicator,
- a description of the development of this indicator until that moment,
- an explanation based on most recent research and professional knowledge,
- a description of the planned measures,
- a forecast of the effects of the policy measures and
- a conclusion stating whether the policy objective will be achieved or not.

From the outset, the Policy Effect Report has been intended as a tool for policy-makers, designed to make their task easier and to improve policy accountability . However, in the early years of the Policy Effect Report policy-makers felt threatened, because the Policy Effect Report explicitly showed whether targets had been achieved or not. They felt that they would be blamed for not achieving the targets. It took quite a while before policy-makers saw the other side of the coin, namely the possibility to show in a very clear way that their policies were the right ones, but that causes beyond their control had a greater impact on transport than their policies. With the Policy Effect Report they have a tool to adjust the targets and/or the measures.

This information served every year as a tool to account for the budget spent in the preceding year as well as to prepare the transport budget for the following year. It is important that this information is available in time to be used in the policy process. Therefore since 1999 not only a complete Policy Effect Report has been presented in September at the same time as the budget for the next year, but also in February a short version, a Signal Report, has been presented for the yearly report of the Ministry to Parliament to account for the budget spent last year and to prepare the budget for the next year. The Policy Effect Reports are produced by AVV Transport Research Centre under responsibility of the policy department.

Since about 1995 a large number of regional and local transport and traffic ”policy effect reports” have been developed in the Netherlands. Most of these monitors are based on the method ”to measure is to know”. It appeared to be difficult to ”translate” national policy objectives to a regional or local scale. One obstacle to compare these reports was that a relatively small number of indicators of policy objectives has been defined in a great many ways.

4.3 Policy adjustments

Policy adjustments, for instance, have been applied to the targets and measures set for the reduction of congestion on the national motor-way network. Because the growth rate of the Dutch economy has been higher than expected at the start of the implementation of the Second Transport Structure Plan in 1991, the congestion on Dutch motorways between 1990 and 1995 has worsened faster than expected (figure 5). In 1996, information from the Policy Effect Report contributed to adjusting the targets and reviewing the policy to meet them. These adjustments are known by their names ”Working Together Towards Greater Accessibility” (1996)(a policy plan concerning the transport connections of the main economic centres) and ”Transport in Balance” (concerning freight transport).

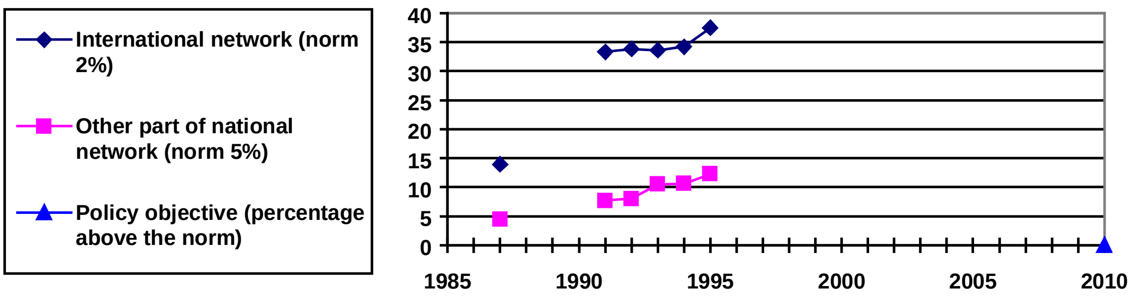

Figure 5. Percentage of the trunk road network in the Netherlands with a higher probability of being confronted with congestion then the norm (Ministry of Transport, 2000)

4.4 Choosing indicators

In 1996 not only the policy directed at the reduction of congestion was intensified, but also a new qualitative objective was assessed: free flow of traffic with an economic function on the main roads near the main cities to be attained in 2005. As an indicator the number of congestion hours was chosen. In 1996, forecasts were also made indicating the congestion to be expected without any transport policy and after the implementation of planned measures (Figure 6).

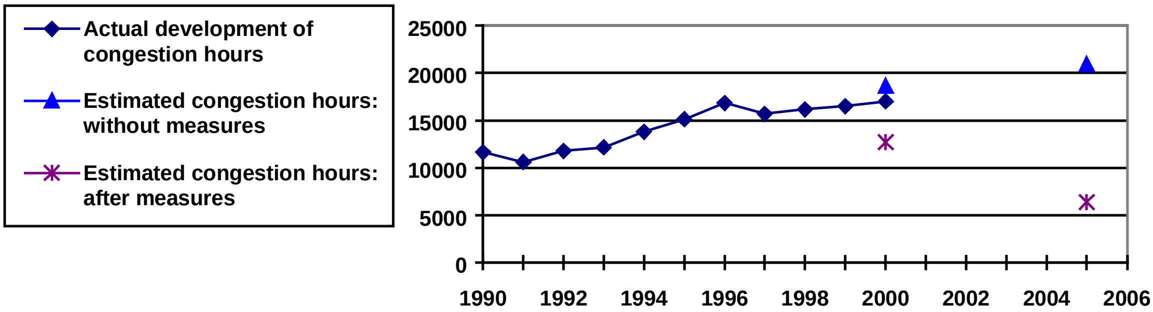

Figure 6. Development of the number of hours lost by congestion by vehicles in the Randstad (the western, urban part of the Netherlands)(x 1000).

The indicator of probability of congestion decided upon in 1991 in later years was regarded as less useful, because it was too much based on road management in stead of the road user and too theoretical in stead of based on observations. The indicator of hours lost by congestions refers to the consequences of congestion for the user and can be observed in the Netherlands formerly on the basis of daily counts by the police, since 1998 on the basis of electronic detection built in the road surface. Disadvantage of this indicator is that it only refers to shortcomings of the road infrastructure without any reference to the positive achievements (how many cars are served by the provisions). Therefore in the new transport plan (NVVP, see further) another long-term objective and indicator has been introduced: a minimum speed of 60 km/hour during peak hours of the traffic at the trunk road network.

4.5 Techniques for ex post evaluation of policy plans.

To identify the impact of policy measures on the development of congestion over a number of years, the analysis has to deal with a number of explaining factors: e.g. increasing road capacity, traffic management measures, policy measures influencing the demand for transport such as pricing measures and improving alternative transport modes, and external factors such as demographic, social, economic and geographical developments.

In the period from 1990 until 2001 a lot of ex post evaluation studies have been carried out. Most of these studies concerned certain projects or certain policy measures. The explanation in the yearly Policy Effect Reports was based on these ex post evaluation studies and on statistical information about developments in transport and in factors influencing transport objectives. So, the explanation was based on a combination of several kinds of objective information and expert judgements.

To arrive from ex post evaluation of separate projects and policy measures to objective ex post evaluation of policy plans or programs appeared to be a further step which was very difficult to make. Since some years we are developing methods and acquiring experience to do so (AVV Transport Research Centre, 1997; MuConsult, 1999; AVV Transport Research Centre, 1998b; AVV Transport Research Centre, 1999a). Two main problems are that not enough reliable data are available and that no method is available to analyse these data. An important stimulus to develop an empirical and objective plan evaluation was the new national budget system which is being introduced in the Netherlands on request of the parliament.

A first step in trying to identify the impact of a policy plan on congestion was therefore to develop a conceptual explanatory framework, the next step was to collect data. Furthermore, a method for analysis was developed which could identify the relations between the explanatory factors and congestion, the factor which was expected to be influenced by policy measures. This method uses statistics concerning external developments (e.g. population, labour participation, geographical data, traffic congestion), results from ex post project evaluation studies and data from experts on local developments and circumstances. The method consists of an integrated approach in which regression analyses, known elasticity's and expert opinions are used to separate external developments from the policy effects (see for a more detailed description Van der Loop *et al*, 2000).

4.6 A new long-term transport policy plan: NVVP.

As the Second Transport Structure Plan is legally in force until 2002, preparations for its successor, the National Transport and Traffic Plan (NTTP)(Ministry of Transport, 2001), have been started and will probably be decided upon round May 2001. This plan has to meet the demands of the Planning Act on Traffic and Transport, a law on planning national transport and traffic policy, which was passed in 1998. According to this law the central, regional and local authorities have to make transport plans in co-operation with each other and in such a way that conflicting targets and solutions will be avoided. This corresponds to the principle that regional problems can best be solved regionally. The Planning Act makes the central, regional and local authorities in the Netherlands responsible for a coherent transport policy. The coherence has to be expressed in so called 'policy essentials'. These policy essentials must be equally present in the central, regional and local transport plans (and are referred to as national objectives for which central, regional and local authorities are responsible). The Minister of Transport has to account for the progress of the national policy towards the objectives set in Parliament using information on the progress of the regional and local plans. Thus, not only the central authorities, but also authorities at a regional level are required to make transport plans. Moreover, they have to monitor the execution of their plans. Plans and evaluations have to be carried out in a co-ordinated way, so that national objectives can be reached. Figure 7 illustrates these different perspectives by a visual representation.

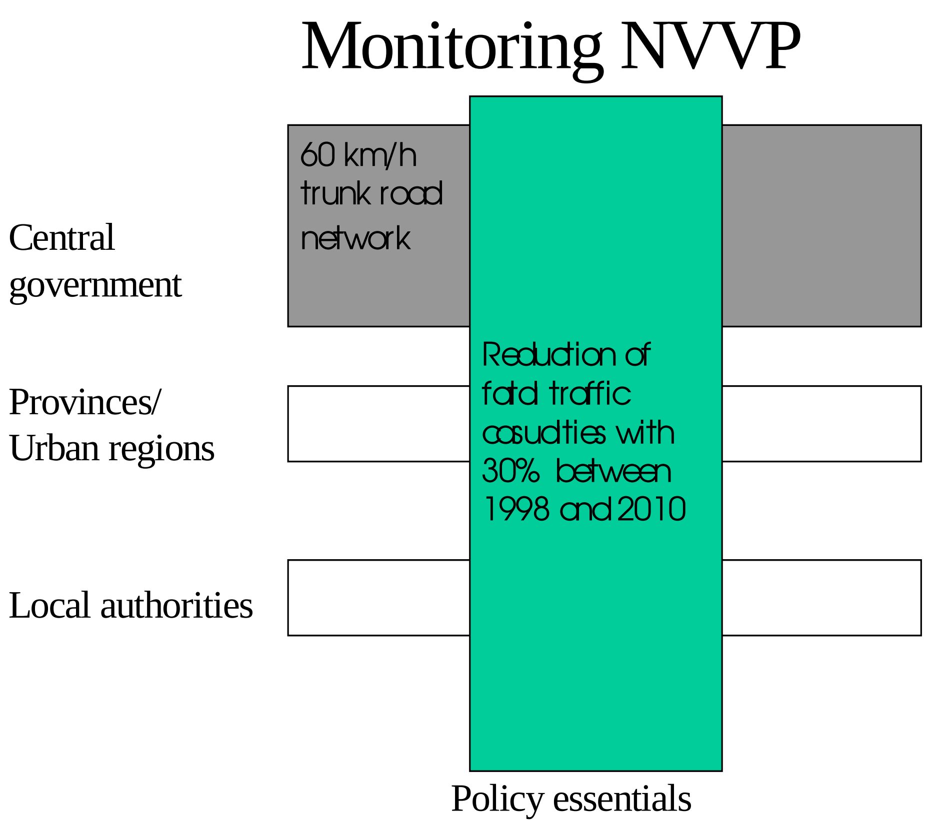

Figure 7. Structure of the monitoring system for NVVP (with some examples of policy objectives).

4.7 Monitoring in other countries

A system of monitoring as used in the Netherlands is not being used elsewhere. In the U.S.A. planning reviews are made about metropolitan areas by Volpe for the federal government (U.S. Department of Transport, Internet: www.volpe.dot.gov). In the Annual Evaluation Review the European Commission provides information on the Commission's evaluation activities, on the main evaluation findings and on action taken as a result of evaluation (http://europa.eu.int/comm/budget/evaluation). In the U.K. a monitoring system has been planned for the next long-term transport policy plan. In the UK, all departments report on meeting the targets they have set. The National Audit Office makes an analysis of these reports (www.nao.gov.uk). Also in other European countries initiatives for policy evaluation are taken. E.g. in Switzerland, a proposal has been developed for ex-post evaluations of Swiss transport policy (Swiss National Science Foundation, 2000).

5. CONCLUSIONS

5.1 Reaching Policy Objectives.

The national planning and evaluation system based on the method "To Measure is to Know" appears to be a powerful tool making clear to what extent objectives set by the government can be attained. This system, given concrete expression in yearly Policy Effect Reports, is based on theory but is made practical by clear overviews of objectives and actual developments. After a few years of existence, it appears to be increasingly accepted by policy-makers. At the moment this overview is also available to parliament. On the other hand members of parliament demand this kind of information. Information from this system is gradually being better incorporated in the process of policy-making and budgeting. The way of dealing with policy objectives and budgets corresponds to the new budgeting system the Dutch government is preparing.

5.2 The Evaluation process sets Requirements for the formulation of Policy Objectives and the definition of Indicators.

As the descriptions of method and results above indicated, a number of requirements have to be met to be able to report in a concrete, systematic way about policy progress. Quantification, agreement on objectives, unambiguous and understandable objectives are examples of such requirements and these can be met. Indicators should be representative and measurable. It is also preferable to make forecasts and chart a course. Finally it is important that the results should be available on time: in this way the results can be used by policy-makers to continue or intensify the policy program.

5.3 Information about Means, Results and Effects

To make decisions in an optimal way, information about means (input), results (output) and effects (outcomes realized by policy means) is essential. At the moment in the Netherlands some information about means, results and effects is available, but this information is neither well structured nor available in a clear format. The same goes for knowledge on the effects of measures. Many evaluation studies are carried out. But it appears to be difficult to test the relationships between measures and effects in an empirical way. Moreover it appears to be difficult to make the results of studies that are carried out available to others engaged in policy-making. An attempt to design a methodology to identify the effects of transport policy measures was frustrated by the requirement for too many data at a detailed level. At the moment experts provide explanations for the development of every indicator based on effect studies and other knowledge. A more systematic way of determining effects is still being looked for.

5.4 Developing a Planning and Evaluation System with Regional Authorities

Experience with the national policy plan during the last few years has demonstrated that decisions about policy objectives require more than simply adopting some quantitative long-term goals. For policy-making and management, intermediate goals are just as important, along with information about policy measures, their effects, external developments and the process. Development of an NVVP monitor is now in progress.

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ANNEX: IWW (SCHOCH): THE IWW EUROPEAN TRANSPORT MODEL AND GTF

The IWW European transport model and GTF

Paper prepared for the SPOTLIGHT Workshop 11.-12.10.2001, Barcelona

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1. The IWW European transport model VACLAV

Starting from a national model for Germany IWW has developed a European model (named VACLAV) for passenger and freight transport (Freight restricted to assignment) during the last years. VACLAV is based on the classic four-step approach and covers all long-distance trips between NUTSIII zones for whole Europe.

Since it is impossible for one institute to develop a European model solely, several partners in Europe have been involved within several projects funded by the European Commission. Additionally the passenger model applications have been performed in co-operation with MKmetric, Karlsruhe. Due to this structure there have been two main data exchange flows: The construction of databases with transport data for the whole Europe (network models, socio-economic data and data for model calibration and validation) and the exchange of results of the different model steps.

Existing problems

IWW experiences with data exchange showed the following problems:

- Transportation data is in most cases provided in heterogeneous formats. Each institute uses its own format, for example to store traffic flow data. It is always necessary to write a conversion tool. Normally data is exported as text files from the internal databases. The syntax and the semantic of the data have to be provided in an extra documentation. This is a very time consuming process for both parties.
- Also good documentation, which mostly hopefully comes along with the data, provides not all the information that is necessary for the user. This is due to the fact that the documentation is written by researchers, who have been working for a long time period with this data and are not aware of the information other users may need.
- A clear definition of basic assumptions is sometimes missing (e.g. differentiation long/short distance trips and exact definition of travel purposes).
- Geographical information (e.g. node co-ordinates within network models) is sometimes provided in a "non-standard" projection (optimised to display a restricted area correctly). Integration of network models, which do not use standard projections is a very time consuming task and becomes nearly impossible if a different network structure (e.g. section aggregation) is applied.

More severe problems occur if international data for model calibration and validation are needed. International surveys are mostly restricted to a specific corridor or to a restricted area (e.g. the alps and channel crossing). There is no common methodology for national surveys, and therefore it is a very tough job to combine or to compare the outcomes of these surveys.

Benefits of GTF

The use of GTF would be the right way to solve some of the problems listed in the last section. Once translators are implemented the exchange of data between different models will become more uncomplicated. Some possible sources of error (e.g. dimensions and unit definitions) are eliminated if GTF is used.

With a clear definition of possible input and output of the transportation model, it will be easier to provide interfaces (also via the Internet) to the models. Also a common interface for sending requests to several models may be feasible.

As the structure of the transportation data is reflected by the exchange format is given, consistency checks within the specification can be easily realized.

At the first glance the specification and the whole process may look complicated. But it reflects the structure of transportation data, which is also logically used within the transportation models and the software implementations respectively. Due to the object orientated approach the specification should be flexible enough to model also future developments in transportation modelling.

2. Discussion of the actual GTF specification

- The current GTF specification seems to stick to the "traditional" network flow model, using a fixed zoning system and transportation network models that are connected via access/egress points.
- In the current specification activities and the associated trips chains are not well described.
- Further methods to prevent inconsistencies should be included.

Beyond GTF

GTF is a necessary step to provide a platform for data exchange, which would avoid many of the problems, which are associated with the exchange of transport data between different models and/or countries. But beyond the syntax and the semantic of the data also a kind of basic structure should be provided. Most of models operating at the European scale are based on the NUTS nomenclature provided by EUROSTAT. As the administrative zones defined in NUTS are not always appropriate for the use as transport analysis zones (e.g. on NUTS III level) a similar set of European transport zones, also on several levels of aggregation, should be constructed. The application of this nomenclature for travel surveys would remove some source of error during model estimation. Also common network models, associated to the transport zones, should be provided (starting from the GISCO network models).

Conclusions

The GTF vision is a necessary concept to ease the data exchange between different models, especially for those working on European level. It will also provide a good instrument to create consistent databases for European transport data. The specification should be kept flexible enough to keep track of future developments.

ANNEX: TRT (MARTINO): GTF: NEXT STEP TO ADOPT AN STANDARD TRANSPORT DATA MODEL

SPOTLIGHTS - 3RD WORKSHOP

GTF: Next step to adopt an standard transport data model

11-12 October 2001

Institute of Territorial Studies

Barcelona

A few ideas on GTF (generalised transportation-data format)

Davide Fiorello and Angelo Martino

TRT Trasporti e Territorio

This short note puts forward some ideas related to the relation between the GTF approach and our modelling experience at European level.

1.1 GTF to improve the link between databases and transport models

One of the benefits to be expected by GTF is about database classification for their use in transport modelling. In an ideal situation where all databases make available their own GTF translator, it would become much easier to analyse their content and to compare data among different sources.

It seems quite clear that the choice of a common format for transport data does not imply that existing databases (e.g. EUROSTAT or national statistics, institutional data, etc.) will automatically go towards a harmonisation of their content. Indeed transport modellers are only a small percentage within the community of databases users and therefore it is likely that there will be resistance to radical changes of data structures, which are normally built for a wide range of purposes. Thus it is likely that databases will continue to be different among themselves, in many cases presenting incoherent data. Nevertheless, the GTF conceptual model would be a significant help for the modellers to look inside the databases and to better understand which the most appropriate for their scope.

Making a distinction between, on the one side, *basic databases* (e.g. EUROSTAT statistics) and, on the other side, *model databases* (the result of modellers' work starting from raw available data, including basic databases), the recommendation would be to adopt the GTF conceptual model at basic data level. If each model database is based on the same elementary components, models would be easier to compare

when answering questions like: do they have the same definition of flows? do they have the same definition of link types? do they have the same zoning system? Thus the objective would be to force ”transport oriented” databases owners/producers to go towards a common format like GTF.
It seems important to highlight that a GTF oriented model database would be easier to be explored and compared with others, but this doesn’t imply that it can be transferred to another application. This would happen because each modeller normally merges basic data and makes them consistent with reference to its specific model design. It is then very likely that another modeller would need a different structure. So, the model databases could be compared – and this is good – but a few resources would be saved in building a new one. Conversely, benefits would be greater if the GTF harmonisation efforts were made since the origin of the process, using the most detailed definition of modes, commodity groups, etc. so that every modeller could use the same source and aggregate data according to its specific requirements.

1.1 Experience in analysing databases at European scale

What is argued above is suggested from our experience of data users. In the course of the development of the two research projects STREAMS and SCENES – both awarded by EC Directorate General VII in the IV Framework Research Programme – an extensive use of freight transport data was carried out.
Different organisations produce data of freight traffic in Europe, anyway, EUROSTAT is definitely the most important and complete reference for European freight transport data and two main databases report data on freight flows: External Trade by Mode of Transport (TREX) and NewCronos – theme 7 (NC).
Neither TREX nor NC constitutes a complete database of European freight traffic. Both sources miss some data and, in both sources, some of data reported is not fully reliable. Methods of data collection are different, modes are not defined (although only implicitly) in the same way, group of commodities are different, etc. Nevertheless, if a complete picture of freight transport in Europe is needed, information from both databases has to be merged.

- The TREX database is based on custom declarations by transport operators (for transport outside EU) and trade declarations by manufacturers, and then the information about the modal split raises a considerable uncertainty. Indeed manufacturers are usually able to appreciate only the transport mode of their terminal stage of the shipment and so they ignore the actual main mode used along the journey. Besides, intermodal transport (road + rail) is classified as ‘road’ and when container or swap bodies are used shipments are registered under the NST/R chapter 9 (Machinery and Miscellaneous Articles) disregarding the actual nature of goods carried.
- NC is built thanks to national surveys in each EU country regarding means registered in that specific country, so that all non-EU trucks are excluded as they are not sampled in any countries. Second, although statistics about tons-km of international consignments by country are provided by NC, they refer only to the part of trip which take place within the customs of the country which dispatches or receives the goods. Therefore, to know the total amount of tons-km carried for international shipments, figures regarding transit in third countries should be added. However, the transit figures are not available for road from NC. Finally, NC data includes trips to or from ports within the national traffic, even if the goods loaded or unloaded at ports come

from or are directed to foreign countries. This means that national traffic is overestimated mainly for small countries with relevant port activities (e.g. The Netherlands or Belgium).

The two data sets were processed and merged to build the STREAMS/SCENES model database according to the specific model requirements, i.e. adopting specific solutions to the multiple gaps on the basis of transport flows definition, transport modes components, etc. A GTF classification of the resulting transport model database would make it more transparent, but certainly would not help that much in its transferability to other applications. Life would be definitely easier a major step towards GTF direction would be taken by the basic databases (see box overleaf).

To summarise, in our opinion the adoption of the GTF could be useful to compare the data structures of different models. Furthermore, the basic idea of GTF could be very important when transferred to the production of basic data by official sources.

2. GTF to compare transport models results

The positive benefits of GTF expected in the comparison of transport models data structures might be less relevant with reference to the comparability of transport models results. This is because normally transport models have different designs, different purposes and therefore different focus on the results to be produced. Considering strategic transport models, i.e. those under examination at the EU level, it is quite clear that there are differences in the type and the number of passenger and freight transport flows, in the network density, in the representation of intermodality, etc. All the above makes it extremely difficult to compare their result in a systematic way, even with the help of the GTF conceptual model. On the other hand, the role of GTF would be significant in terms of standardisation of the procedure to interrogate transport models and to retrieve their results.

The picture is different when we come to network assignment models: also in this case there are differences among the models (algorithms, vehicle classification, etc.) but at the end of the day they all provide loads on network links and thus results are definitely more comparable, provided that the definition of model elements is a common one. Therefore, the benefit of GTF here would be certainly significant.

A few notes for a transport-friendly database of freight transport in the EU

The same principle as that behind the GTF, - i.e. homogenisation and standardisation of basic elements - could be used to build a database of freight transport which could be a reference for most of transport modellers at European scale. Among the main requirements of such database we could mention:

- *Specification of the total national traffic components in NewCronos*. The total volume of traffic should be divided into two categories: ‘pure’ national traffic and ‘sea borne’ national traffic. In such a way it could be immediate to refer to one aggregate or to another according to what data is needed for. *The same could be applied to the international data*, in order to distinguish the amount of traffic which is born in the country where the survey is carried out and the traffic for which the means of transport of a country are only a go-between for a trade involving two different countries. If the dimension of the national surveys permits, the third country (origin or destination of the international sea borne haul surveyed) might be identified as additional information in order to crosscheck TREX.
- Aside of the current data regarding national freight traffic, *NewCronos should ideally be added with a section devoted to sea shipping*. This means every EU member country should carry out a survey at ports.
- *TREX data should be homogenised* in order to achieve a consistent matrix where the amount of goods imported by country A from country B is equal to the amount of goods exported by country B to country A. Of course this should be true for all modes and all types of commodities. As the TREX is the result of thousands of independent declarations, it is unlikely that consistent data can be obtained by verifying the raw data. Most likely, statistical procedure might be adopted to adjust the matrix (as most of data is only slightly different between import and export).
- In order to make NewCronos data fully comparable to other European Statistics, EUROSTAT should require that national survey provide data with a territorial break-down which match the NUTS II classification. This means that *national surveys should adopt the NUTS classification* or a further break-down.
- After the different corrections, *TREX and NewCronos data should be partially overlapping*. For instance, rail traffic should ideally report the same figures in both databases. This is not true for road freight traffic as NewCronos would not take into account cabotage i.e. trucks of third countries. Anyway, the information from one database could be used to check and validate data of the other database. The ideal situation of perfect correspondence would be difficult to achieve, but a better degree of reliability could be obtained.

ANNEX: MINERVA (LOGIE): EXPERIENCES FROM TRIPS AND OBSERVATIONS FROM PAST EXPERIENCES

GTF Workshop Report

1. Background

These observations are based on the author's experience of developing and using transport planning software for over twenty five years. Until last year, the author was involved with many aspects of the design and development of the TRIPS transport modelling package, but he has also developed a number of simulation models covering urban, rural, and motorway conditions, as well as being familiar with various other sets of transport modelling software.

The TRIPS software has been long established, so a substantial design project to develop a new architecture that was free from some of the legacy constraints meant thinking about data issues in a way that is relevant to the interests of GTF[1].

2. Paradigms for GTF

2.1 Object Oriented Methods

The GTF design has been based around the approaches associated with object-oriented (OO) methods. These have become the accepted philosophy for almost all software development, although it should be noted that the concepts remain largely unfamiliar to transport modellers.

The use of OO methods is helpful in a number of regards but it must be recognised that the definition of the objects is more an art than a science. This raises the question of whether the correct set of objects has been defined and, if so, whether the methods of the object are satisfactory. Because it is difficult to answer in a definitive way, it is necessary that the GTF design incorporates an ability to

[1] Changes in the ownership and management of TRIPS have now meant that the design has not been implemented.

adjust according to experience. This situation is assisted by one of the distinguishing feature of OO, namely polymorphism, which provides a built-in degree of flexibility.

However the flexibility needs to extend to thinking about different ways in which transport models can be applied. One type of distinction is whether a model is a demand model, a supply (network) model, or an integration of both. There are also distinctions as to whether models are static or dynamic, depending on their treatment of time. There is no ideal model, so practical models adopt one form or another or, significantly for GTF, often seek to link different types of models, say a strategic demand model with a more detailed network model.

It may be observed that the current GTF design has objects that are strongly network orientated. The GTF design includes logical links between networks and spatial objects, notably zones, but this is not sufficient from the perspective of demand modelling. This requires that there are objects more strongly related to people and freight.

The definition of objects needs also to be more adjustable to scale. The analogy can be made with GIS systems which reveal more detail (objects) as the scale of view is reduced. In the case of GTF it is necessary that the objects can alter their representation, so that, for example, networks are simplified at larger scale views. A topic of considerable complexity, but which should nevertheless be handled by GTF, is the transfer of intersection data so that detail is preserved and adjusted where necessary. This is difficult because the definition of intersections is not always clear and some models will wish to view an intersection as a simple node, but others will require further details on the junction structure. The more detailed views can require single, large intersections to be represented more precisely as sets of intersections, depending on the modelling requirements.

2.2 Packages

An aspect of object design is to determine how ‘large’ the objects should be. This is partly a matter of compromise; smaller, simpler objects are easier to comprehend and to make robust in operation, but this can lead to there being many objects that are difficult to understand as a group. This is a problem that the GTF design faces; there are many objects and it is difficult for non-specialists to appreciate their features without considerable effort.

This somewhat psychological matter is important because GTF will have to commend itself to a sometimes sceptical audience who have to be able quickly to see the main principles.

As this problem is common to most OO designs, the use of ‘packages’ that group objects into meaningful sets provides a means of hiding design details so that the key features are apparent. This is partly a matter of presentation; the packages themselves add little beyond the capabilities provided by the objects.

Thinking about the specification of packages and their contents is a good way of defining a broad structure for GTF that can be appraised and understood from a number of perspectives, such as for different model types.

2.3 Components

The use of components in software has come to refer to elements of software that can be re-used in different circumstances from those for which they were originally designed. They are associated with CORBA and Microsoft's COM technologies (e.g. ATL COM). These 'COM components' incorporate the OO paradigm, but their distinguishing feature is the definition of their interfaces. That is, the definition of their sets of input and output information, and the methods that they support.

Once an interface is published, it cannot be changed. It represents a form of contract that the supply of a conforming set of input information will generate a set of output information. The details of how this is achieved are invisible, which has the considerable merit that people no longer have to worry about such matters. Of course, there come times when it is necessary to change the capabilities of an interface, but this involves publishing a new interface rather than changing an existing one.

COM components have a number of practical advantages, such as: they may be written using most common software languages (e.g. C++, Visual Basic, Delphi) and can readily be used in association with XML; their use can be controlled by licenses; they can be distributed easily. COM components do not run by themselves, but require some hosting software. This can be quite varied in nature, including standard Internet browser software or customised software. It is important in practice that COM components are actively administered and managed, much in the way of books in a library. The spotlights thematic network is suitably placed for this activity.

3. Experience with TRIPS and other software

3.1 Data Transfer

When data is transferred between models, it is not too difficult to transfer highway networks and trip matrices, as well as zonal data. However, the problems of transferring intersection and public transport service descriptions generally mean that it is more effective to re-input the information. This typically arises because of rather subtle differences of definitions with respect to lane markings, traffic signal controller details, walk (access) network specifications, timetable specification, and so on. It is necessary for GTF to be sensitive to such issues.

3.2 Model structure

A distinctive feature of TRIPS is the manner in which it allows the structure of models to be defined using graphical tools. These tools are largely self-documenting of the model through a combination of graphical presentation and text. The models are normally represented in a hierarchic manner, providing high level overviews that can be used to gain straightforward access to further details.

The software allows the model structures to be modularised, and maintained in the form of libraries, so that modelling components can be transferred between (TRIPS) modelling applications. This aspect of model information transfer has significant practical value.

3.3 Command language

As with a number of other modelling software packages, e.g. Emme/2, TRIPS provides a command language that greatly extends the scope and flexibility of the model, notably in relation to demand modelling. It is possible to view scripts made from the command language as a form of data. That is, the use of the model can involve changing the modelling process as much as changing data describing transport infrastructure and demand. Flexibility of command language could be considered a legitimate aim of GTF. In this case, the idea of components with interfaces, as previously described, would be relevant to accommodating different modelling languages.

3.4 Integration with GIS

The integration of transport modelling with GIS is made practically difficult because modelling benefits from simpler network representation than are usually provided by GIS network data. However, GIS network data is nowadays precise and regularly updated, e.g., MapInfo's StreetPro product is available across Europe.

It is now possible to remove network detail that is extraneous to modelling (e.g. shape nodes) so that the model 'sees' a more schematic, modelling view (i.e. as conventional models) but the user sees a detailed network on screen. This was demonstrated in prototype for TRIPS using GeoMedia GIS. It would be valuable for GTF to offer such a bridge between GIS networks and transport modelling networks.

ANNEX: ME&P (WILLIAMS): ROLE OF GTF

Encouraging Dissemination and Widespread Adoption of GTF

Ian Williams, ME&P, Cambridge, UK

1. Introduction

This note discusses a variety of issues related to the longer term usage of the GTF. It reviews the potential barriers to its widespread use and the means by which these barriers might be surmounted.

The views in this paper are those of someone who does believe strongly in the need for a standardised approach to the communication of data between transport models. The benefits would arise because standardisation should:

1. make it cheaper and easier for comparisons to be carried out between modelling packages so that scientific progress is accelerated
2. generate economies of scale through minimising transfer costs between software packages, so that new modelling procedures for tackling emerging issues can be easily combined with existing models/packages
3. ensure that best practice, as exemplified in a particular modelling package, can become widely and easily available for use, through enabling users to substitute a module from one package by a superior module from a different package - in this way the productivity benefits of competition would flourish
4. improve the robustness and comparability of model outputs by adopting rigorous and consistent definitions of the data that they use
5. lessen the costs of model development by enabling standardised use of standard statistical data sets produced by government and commercial data providers

However, despite my identification of the potential benefits from standardisation of data transfer, I have to ask myself certain questions.

- Why does the modelling package MEPLAN that my company ME&P commercialises not have full GTF functionality as yet?
- What would be required to make this approach the standard within ME&P?

This then leads me to the wider question:

- How would others, who may be less convinced of the above potential benefits, also be persuaded to fully adopt a GTF based approach in their everyday work?

This question is examined in more detail in the rest of this note.

2. Obstacles to the use of GTF

As with most attempts to persuade individuals or firms to change their behaviour, ideally it is preferable to focus on encouragement rather more than on pressure (more carrot than stick!). What are the possible barriers that modellers might perceive to the widespread adoption of the GTF? Responses are likely to include:

1. Model developers are busy people so why should we spend our time and money on developing something that is not cheap and has not been needed in the past?
2. It is all too complicated! If we ignore it, it may go away! What would we lose out from doing nothing for the present?
3. When everyone else has signed up to it and when the system has been widely experimented with, tested and perfected by other guinea pigs, then and only then will we spend our money on it
4. Improving the general understanding of which are the better modelling packages and model implementations may be a worthwhile exercise in principle, but why spend our money in supporting this when there is no guarantee that our own approach would ultimately appear to do well?
5. Is the market for its use is sufficiently large relative to the costs of bringing it into widespread use? – Would it ever be a cost-effective initiative?

It is clear that there are not necessarily easy answers to all of these issues just raised. The set of challenges can for the most part be summarised through trying to provide an answer to the following:

6. Suppose you are the software and modelling manager for a large firm – the Finance Director requests you to make out a commercial case for the firm to invest in developing full GTF functionality for your software and selected models. He wants a 5 year cash flow estimate of the set-up costs and of the increased revenue stream resulting from this investment. He confirms that your career progress and future salary level will depend on the level of profit generated by this investment. Would you feel confident about taking up this challenge at present?

This sobering challenge leads on to the need to identify:

(i) What is the nature of the market for this GTF initiative? Is the scale of the market large enough to cover the investment costs?

(ii) Who is likely to be the ultimate beneficiary from this initiative – should these then be the people who finance it?

(iii) What can be learned from experience of similar initiatives in related fields? (e.g. engineering models, GIS, CAD/CAM, Statistical agencies, which others?)

Looking now from a more positive stance, we can identify some responses to the issues raised above.

The main clients for the use of transport models are governmental type agencies at all spatial scales, ranging from traffic modelling at the very local level through to DG TREN itself at the EU level. The models are not ends in themselves, but merely tools to be used by policy makers in order to help them to make wise and cost-effective decisions about transport investment, pricing or regulatory policies. Accordingly the primary beneficiaries from overall improvements in the quality and cost-effectiveness of modelling tools should ultimately be the society on whose behalf the policies are being implemented.

For any single provider of models and/or modelling software the benefits from having a full GTF capability lie only in its ability to communicate with other providers. This means however that early entrants would face major starting costs and minimal benefits from implementing GTF, until such time as there is a wide range of other providers with whom to communicate model data, and a clear need to actually initiate such data exchanges.

This relates to an issue that has been analysed in the ATOM FPV project, which is looking at the provision of modelling services to DG TREN. There have been various initiatives by governmental agencies, especially in the UK, to licence the provision of modelling services to private firms. The idea is that every few years the licence would be re-tendered so as to ensure that the modelling service is innovative and cost-effective. However, in this system it has been realised that there is no incentive for the firm that is currently providing the service to document their modelling system and procedures. The less the documentation that exists, the more costly and difficult it would be for any alternative firm to take over the licence when it is re-tendered. Accordingly, it is not easy to ensure that documentation will be assigned a high priority unless the client puts special incentives and controls into place that force the current licensee to do so.

A similar issue may exist for the GTF. It seems likely that the leadership and funding is best put in place by the set of clients, rather than relying on market forces to encourage private firms to implement these procedures. This has in fact been the initial approach whereby DG TREN has funded research projects such as Bridges and Spotlights within which the initial investigations into the GTF have taken place.

There are a number of reasons why DG TREN is the most logical driver of the continuation of the GTF initiative:

1. The larger the market (i.e. European rather than national) for the potential use of the GTF the more likely it is that it could be made cost-effective.
2. The main benefits arise from uniformity, so that it should at least be applied at the European scale and ideally on a worldwide basis. The Commission is uniquely placed to encourage harmonisation across European countries and to avoid inter-country differences in application.
3. The European Framework Research projects are already set-up to address just these types of standardisation initiatives.

Turning finally to the GTF itself, there are some aspects on which we should focus attention.

(i) Great care is needed to make sure that the detailed design of the GTF system is initially set up in an appropriate fashion. If the first attempts fail for some reason, then it would become more difficult in subsequent attempts to build up momentum and good will. This implies the likely need for considerable future work in developing this area prior to widespread application. A few carefully monitored pilot studies are needed initially.

(ii) It is important to ensure that the GTF connects directly with mainstream developments of this type. The proposed use of XML is one such aid. If the standardisation becomes too particular to the small world of transportation modelling then the GTF will lose touch with developments elsewhere (e.g. in the provision of standard statistical data, in commercial GIS packages, etc.) and will become out of date and expensive to maintain. Unfortunately, the need to connect with developments in other, directly or indirectly related, areas pushes up the costs of development of GTF and slows down progress in the short (but not the long) term.

(iii) The GTF needs to be made relatively cheap and easy to adopt – otherwise it will not gain momentum and will fall into disrepute

(iv) It needs further financial support and in due time will need regulatory support from DG TREN to enable a critical mass of implementation to be achieved.

This might mean some future regulation that all data inputs/outputs from DG TREN funded models would need to be made available in GTF. There is no point to requiring this today from modellers, because as yet considerable further development of the GTF is needed. However, the long lead times of Framework Research projects means that such a regulation should be seriously considered at present, even if it is to only expected to become fully operational in practice at some later stage in the future.

Any such regulation should only be applied at a stage when there is complete confidence that the GTF structure is relatively cheap, robust and flexible for modellers to apply so that their costs are demonstrably much smaller than their benefits from its use.

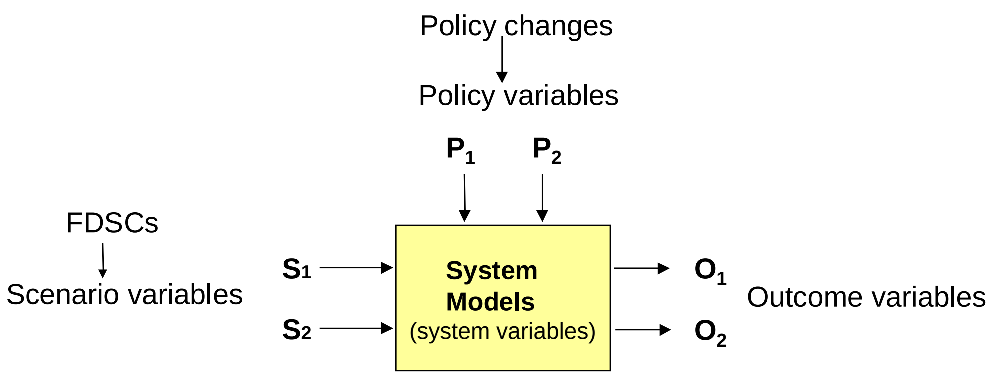
ANNEX: RAND (WALKER): POLICY VARIABLES

What is the minimum set of policy or policy-relevant variables to include or describe in strategic / network models?

Suggested revision by Warren E. walker, RAND Europe

The answer to the above question is intimately dependent on the policy problem being addressed, the policy changes being considered, and the outputs needed from the models. The following diagram, although overly simplified (e.g., it includes no feedback loops), can be used to help clarify the role of system (strategic/network) models in analysing transport policies and, thereby, to help answer the above question.

Referring to the diagram, *outcome variables* are the measures of the performance of the system that stakeholders care about and that policymakers would like to use in comparing different policy options. The *system models* represent the portions of the transport system (and other relevant systems) whose performance determines the values of the *outcome variables*. Two sets of forces act on the system and can lead to changes in the structure of the system and its elements: *external forces driving structural change* (FDSCs), which are outside the control of policymakers, and *policy changes*. The external forces are highly uncertain. Typically, *scenarios* are the analytical tools that are used to represent and deal with these uncertainties. Each scenario is a description of one possible future state of the world. Scenarios do not include complete descriptions of the future; they include only factors that might strongly affect the outcomes of interest, and are usually described in terms of the values of *scenario variables*. Policy changes are described in terms of the values of *policy variables*. The system models should be designed to use the values of the scenario and policy variables as inputs, or to be able to be modified (i.e., the system representation changed) to reflect these values. When the system models are run, the changes that the external scenarios and the policies produce in the structure of the system will produce changes in the outcome variables.



Using the framework in the above diagram, the answer to the question "*what is the minimum set of policy or policy-relevant variables to include or describe in strategic/network models?*" can now be addressed through seeking answers to the following sets of questions:

What performance measures (outcome variables) are to be estimated?

- Demand
- Travel times
- Emissions
- Congestion
- Noise
- Economic effects
- Financial costs
- Safety
- Other

What policy changes are to be examined?

- Passenger/freight
- Modes
- European/regional/urban
- Infrastructure
- Vehicles
- Prices
- Regulations
- Other

What scenarios are to be used?

- What FDSCs do they cover (economic, political, social, other)?
- What scenario variables are used to describe the scenarios (population, GDP, employment, private consumption, investment, public consumption, imports/exports, fuel prices, other)?

How are the policy changes to be tested (this depends on who will implement the policies and how they will be implemented)?

- Separately and consecutively?
- In packages and independently?
- In parallel?
- In a static and/or dynamic fashion?

What system models are to be used?

- Geographic coverage
- Level of aggregation
- Network
- Theoretical assumptions
- Static/dynamic
- Stage being modelled (production/attraction, distribution, modal split, assignment)
- Impacts being assessed (economic, environmental, congestion, etc.)

How were the models calibrated /validated? On the basis of which data sources?

What assumptions do the models rely on with regard to passenger transport costs?

- Car operating costs
- Tariffs
- Operating costs
- By mode

What assumptions do the models rely on with regard to freight transport costs?

- Tariffs
- Operating costs
- By mode

What assumptions do the models rely on with regard to car ownership?

- Occupancy rates
- Trip rates

What other assumptions should we care about?

ANNEX: NEA (BURGESS): THE EUROPEAN TRANSPORT MODEL DIRECTORY (MDIR) – ANALYSIS OF MDIR RELEVANT FOR GTF

The European Transport Model Directory (MDir)
Analysis of MDir relevant for GTF

Paper submitted for the SpotlightsTN GTF Workshop, Barcelona 11/12 October 2001

Arnaud Burgess (NEA)

1. Introduction

spotlightsTN main objective is developing and achieving an agreement within the European Modelling community in relation to four issues (the 4 spotlightsTN discussion lines) which are considered ”keys to bring advanced models to lights”:

Quality control procedures and deontological codes for modellers and end-users (DCode)

Harmonised descriptions for models to be included in a common European Model Directory (MDir) (providing input to ATOM)

Data formats (GTF) for standardised data exchange between models and software tools

Long term opportunities (LT) for model’s integration to decision support systems. Current Best Practices and Future Trends. Implication on organisational and institutional arrangements (input from ATOM)

The long-term ambition of spotlights is helping policy makers and experts (”end-users” of scientific models) to make an effective use of advanced scientific models. NEA is in the spotlightsTN project responsible in the project for setting up MDir.

This report describes results of MDir that are relevant for the GTF workshop. Previously results of MDir have been used for a presentation in the Think-Up-TN. Also requests by Alpnet TN and IASON are made for giving an overview on some aspects of European transport models.

The status of MDir is that 222 European transport models have been included in the MDir database. The MDir database consists of 57 characteristics on which models are described. Notably in the characteristics, the policy relevance of models plays is important; i.e. what is the transport domain of models (passenger/freight) on what scale do the models operate? As such, the MDir will help policy makers/modellers to learn from past experience. The difficulties encountered so far in setting up the MDir are:

to get complete information on a model: only the modellers that have constructed the model seem to be the only ones that can give the best level of detail in describing the model;

the maintainability of the MDir: during the spotlightsTN NEA is responsible for this, thoughts must be given who is responsible for this after the project; It is essential that one organisation is harmonising the diffuse information that is filled in

the 57 characteristics take time to fill in, if a self-sustaining system is aimed at (see point a) then this could be an obstacle.

Another activity has been the linkage of the models to a) CTP (Common Transport Policy) goals and b) to a set of policy variables (policy key words) so the describe the goal of the model. Future developments are a) to include more models (we think that about 80-85% of European models are included at the moment) and b) to have a link with DCode.

The structure of the document consists of two sections. First the results of analysing the MDir are dealt with, split into analysis for GTF and into the analysis of the policy key words. The conclusions are dealt with in the third section.

2. Results analysis Mdir

2.1 MDir in relation with GTF

In this section the relevancy of MDir for GTF is investigated. First of all it can be shown with the software that is used in the transport model. The table below shows the result from MDir. From 106 models out of 222 the used software could not be identified. From the other 116 models the used software could be determined, in the table below an overview is given.

Table Overview of used software in models

MODELLING SOFTWARE	Frequency
not known	106
Statistical package (SAS/SPSS)	2
GIS (Transcad)	2
C/C++	3
Pascal/Delphi	9
Fortran	9
EMME/2	22
GAMS (General Equilibrium Modelling)	1
ITHINK/STELLA (simulation)	2
WINDOWS/OFFICE (Excel/Access/OS)	10
In House Developed Software	33
Minutp	6
Saturn	5
Polydrom (=3)/Qview (=1)	4
TRIPS	3
PTVision	1
TRIO	1
Visem/Visum	3
Total	222

It can be concluded that 64 models use software that allows a greater amount of flexibility to define their output formats (these 64 are constructed in the programming languages: C/Pascal/Fortran, the in house software and the windows software). This greater amount of flexibility would mean that the formats are easier to adapt to GTF. All others use specific software that could be less flexible because of predefined output formats, and could take more effort to be in compliance with GTF.

In another table below the regional detail of the model is crosstabulated with the modelling software. The regional detail means that models are:
of regional/urban nature,
national/regional nature without considering international flows,
national with considering international flows, or
international in the sense of multi country models.

MODSOF * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
MODSOF	not known	29	19	29	26	3	106
	statist.			2			2
	GIS		1			1	2
	C		2	1			3
	Pascal		4	2		3	9
	Fortran		5	4			9
	EMME/2	1	7	10	3	1	22
	GAMS		1				1
	ITHINK					2	2
	WINDOWS		6	3		1	10
	In House		9	12	5	7	33
	Minutp		1	3	2		6
	Saturn		4	1			5
	Qview		1	2		1	4
	TRIPS			2		1	3
	PTVision					1	1
	TRIO			1			1
	Vissem		3				3
Total		30	63	72	36	21	222

In the table above it can be observed that for international models mostly software is used that allows more flexibility in defining output formats, and is more easy to adapt to GTF.

The following table focuses on the database software used in the models (if applicable in the model). For only 20 models this is indicated.

Table *Used Database software in the model.*

DATABASE SOFTWARE	**Frequency**

Not known/relevant	**202**
Access	**5**
Clipper	**1**
DBF/Clipper	**3**
Delphi/Pascal binary	**2**
DOS FORTRAN	**1**
Excel	**4**
ORACLE, SQL	**1**
Visual Basic	**3**
Total	**222**

A large part of the models use predetermined formats (models such as EMME/2, TRIPS), for those models the database software is not filled in MDir.

The GIS software used in models is given in the table below. It can be observed that of 19 models the software is determined. Also it is known that in 36 models no GIS is used.

Table *Used GIS software in the model.*

GIS SOFTWARE	Frequency
Not known	**167**
3D Geographical	**1**
ArcInfo	**5**
Atlas GIS	**1**
Bridges/NIS	**1**
GIS environment	**2**
IWW-software	**1**
MapInfo	**4**
MVGRAF network	**3**
Transcad	**1**
No GIS applied	**36**
Total	**222**

It seems that in a large part of the models linking with GIS is not an issue, given that for 36 models it is explicitly stated that no GIS is applied.

2.2 MDir and policy variables

In this section we give a preliminary overview of the policy variables linked to the models. We have added policy variables on the basis of a list produced by the Dutch Ministry of Transport (and was presented by Eric Bijster of AVV at the MDir conference in Brussels). In total 3 keywords (as maximum) are attached to a model. In the table below we show the 1st keyword (in annex 3 the overall list of keywords is given).

In the table below the frequency of the first keyword is given, it can be observed that a large part of the models is related to infrastructure planning and analysing strategic mobility (respectively 47 and 36 models).

Table *Policy variables related to the models*

FIRST_KEYWORD	Frequency
Not known	**25**
capacity utilisation	**9**
demand analysis	**15**
Environment and emissions	**10**
ex-ante policy analysis	**13**
industrial location decisions	**1**
Infrastructure planning	**47**
intermodal solutions	**2**
Investment analysis	**1**
land-use planning	**6**
modal shift	**2**
Pricing	**15**
project impact assessment	**6**
public transport planning	**19**
safety	**1**
strategic mobility	**36**
traffic management	**13**
water management effects	**1**
Total	**222**

In the table below the first keyword is given by the regional detail of the model.

FIRST_KEYW * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
FIRST_KEYW		12	3	7	3	1	26
	capacity utilisation		6	3			9
	demand analysis	2	3	2	5	3	15
	environment and emissions	3	4	2		1	10
	ex-ante policy analysis	2	2	7	1	1	13
	industrial location decisions		1				1
	infrastructure planning	3	8	15	19	1	46
	intermodal solutions	2					2
	investment analysis			1			1
	land-use planning		6				6
	modal shift			1		1	2
	pricing	1	6	3	1	4	15
	project impact assessment	1	1	2	1	1	6
	public transport planning		6	8	1	4	19
	safety	1					1
	strategic mobility	1	10	18	4	3	36
	traffic management	2	7	2	1	1	13
	water management effects			1			1
Total		30	63	72	36	21	222

It can be seen that in the international models a string focus is on demand, mobility, pricing and public transport (i.e. high speed rail) aspects. National and regional models are focused on infrastructure planning.

Also a link was made between CTP (Common Transport Policy) goals and the models. Again here a crosstable is made between the regional detail and the CTP goal (again here at maximum 3 goals are listed for each model, in this table we have listed only the first listed goal).

FIRST_GOAL * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
FIRST_GOAL		16	9	13	4	3	45
	All goals					1	1
	Contribute to environmental improvement	3	5	2			10
	Contribute to external dimension		6	5	2		13
	Contribute to implementation of Single Market		3	1		2	6
	Contribute to strategic economic development	1	1			1	3
	Improve strategic mobility	5	19	29	11	6	70
	Improve transport safety	1					1
	Maximise transport efficiency	4	20	22	19	8	73
Total		30	63	72	36	21	222

It is interesting to see that international models, models covering more than one country, are concentrated on transport efficiency and strategic mobility.

2.3 Results related to modal split modelling

In this section, some of the results of the MDir related to modal split modelling are presented. It is recapturing the results presented at the Think-Up workshop on modal split models, the classification of modal split models has been made in collaboration with Dr Luis Willumsen. In the table below the regional detail and the domain of the models are indicated, as it can be observed total 222 models are included. In annex 1, all the models are categorised according to this scheme.

The regional detail has been explained before. The other dimension of the table contains the type of

passenger/freight * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
passenger/freight	not known	30	3	2		1	36
	passenger		46	34	4	8	92
	freight		5	25	30	5	65
	both		9	11	2	7	29
Total		30	63	72	36	21	222

model: whether it concerns freight or passenger models or both. It can be observed that few freight models are developed in Europe for regional / urban level. However, at the national / international level relatively more freight models than passenger models are developed. In total 24 models are developed on the multi country level (among which the STEMM, NEAC, and the Ten Corridors study in Central and Eastern Europe). For 36 models, no information is available on this subject.

The question relating to modal split modelling (question 5.4) has been analysed. The following 8 categories for modal split formulations have been identified.
Direct demand and other econometric models with aggregate data
Choice models with aggregate data (logit/probit, etc)
Choice models with disaggregate data (ditto)
Choice models (not known if aggregate/disaggregate)
Mode choice as part of route choice over multi-modal networks (MCMMN)
Simulation models (Monte Carlo)
Modal split included (type of model not known)
Not applicable (in unimodal models for example)
Also there is a category ‘0’ when it cannot be identified if a modal split model is used. The first category of direct demand/other econometric methods with aggregate data it is understood that the trips/volumes transported by one particular mode are a function of that mode and characteristics of people/goods using that mode. Usually these are formulated as elasticity models. The items 2, 3, and 4 represent choice models, a choice model produces an output in terms of relative number of trips made by each of the available alternative modes. Item 2 indicates a choice model using disaggregate data. Item 3 indicates that it concerns a choice model with aggregate data. If it could not be determined whether it is disaggregate or aggregate then item 4 was chosen. Item 5 is chosen when it concerns mode choice as part of route choice in multimodal networks. Item 6 is the simulation approach where Monte Carlo techniques are used. Item 7 is chosen if it is indicated that a modal split function is used in the model but the type could not be identified. Item 8 indicates that the modal split issue is not applicable in the model (i.e. a unimodal transport model).

TYPE MODAL SPLIT * REGIONAL DETAIL Crosstabulation

Count

		REGIONAL DETAIL					
		not known	urban/regional	national models/regional	national models incl. international	international models	Total
TYPE MODAL SPLIT	not known	25	27	11	1	4	68
	direct demand			11		6	17
	choice m. aggr					1	1
	choice m. disa	1	1	9		1	12
	choice m.	2	8	7	6	3	26
	MCMMN		1			1	2
	Simulation			4	2		6
	modal split	2	15	16	8	2	43
	not appl.		11	14	19	3	47
Total		30	63	72	36	21	222

In the table below the type of modal split model is crosstabulated with the regional detail. It can be observed that choice models are the most used (39 models categories 2, 3 and 4 together). The direct demand formulation is used 17 models. The simulation and route choice typology is used in 8 models (item 5 and 6). Of 47 models we do not know the form of the modal split functions (item 7). In 43 models no modal split is included (item 8) and of 68 models no information is available to determine whether a modal split model is included.

In the table below the modal split type modelling is crosstabulated with the type of model (passenger/freight). The choice models seem to be more used in passenger transport than in freight transport. For a large fraction of freight transport the exact formulation cannot be retrieved on the basis of the information in MDir (29 models).

TYPE MODAL SPLIT * PASSENGER FREIGHT Crosstabulation

Count

		PASSENGER FREIGHT				
		not known	passenger	freight	both	Total
TYPE MODAL SPLIT	not known	30	26	6	6	68
	direct demand		7	6	4	17
	choice m. aggr				1	1
	choice m. disa	1	8		3	12
	choice m.	3	16	4	3	26
	MCMMN		1	1		2
	Simulation		1	5		6
	modal split		14	29	4	47
	not appl.	2	19	14	8	43
Total		36	92	65	29	222

These exercises show the possibilities with the MDir. As such, it is way to categorise a considerable amount of information on models. It is aimed at having the information in MDir controlled by the modellers themselves.

3. Conclusions

The MDir is a way to get harmonised information about transport models in Europe. Models can be compared on their characteristics, which in itself leads to interesting conclusions. The MDir will ”set light” on European transport models and can help policy makers and experts to make an effective use of advanced scientific models (i.e. Spanish modellers can learn from experience from Scandinavian modellers, or policy makers wishing to have an answer on a certain type of question can see whether such a model is available). MDir can be a platform for an inventory of European transport models.

Related to the idea of a platform is that stakeholders are willing to invest time in it at low cost. The time to fill in MDir for a model (on 57 characteristics) could work adverse to this idea (on average 30 to 60 minutes depending on whether one knows the model or not). The clarity of the MDir form to be filled in is supportive. Most whom have filled it in could work independently with the help of the glossary.

Annex 1

Detailed results

Annex one classification of the models according to regional detail and whether it concerns passenger models, freight models or both.

Regional/urban – Passenger model 1-1

'Saturn'
ANTONIN
Birmingham Northern Relief Road
East-West Route Traffic Model
ETRAFOM
Forecasting Air pollution by Car Traffic Simulation (
FREDRIK
Greater Manchester Area Transport Study (GMATS)
HPTS
IMREL
Kessel & Partner model
KUR
Lowrian Model
MEPLAN
METACOR
Modele Strategique de Deplacements de lágglomeration
MODUS
ORPHEA
Passenger Train Model
Passenger Transport Model for Helsinki Metropolitan A
Passenger Transport Model for Tempere Metropolitan Area
Performance Indicator Package
PLANET99
QUINQUIN
Railplan
Randstadmodel
RES-DYNAM
ROADNET
SERTM
SETA 'EMME/2' model
SIET
SIMOE
Spatial Development and Public Transport (ROOV)
SUPERNOVA
T/RIM
TELEMACO
The Greater Thessaloniki Transportation Model
TIGRIS (Transport Infrastructure Landuse Interaction
TRAM
Transport model Ile de France
TRENEN
VISEM (under Windows)
VISSIM
VISUM 7.0
Widening Traffic Model
WOLOCAS-II

Regional, urban models - Freight 1-2

Baden-Württemberg Freight Transport Model
FRETURB
Hamburg freight model
IVV / Nordrhein-Westfalen freight model
Traffic Model for Antwerp (freight module)

Regional, urban models – Freight and Passenger 1-3

AIDA
Congestion costs model (FileKosten Model-FMK)
Congestion explorer (Congestieverkenner)
ESIM
Freeway Operations SIMulation (FOSIM)
MARS
MITHRA
Short-term Traffic Model (STM)
West Midlands Strategic Transport Model (WMSTM)

Regional models – Passenger 2-1

ADEMMP
BVWP model
East-West Traffic Model
HELVI
High Speed Trains / 10 Year Highway Plan
Hungary Corridor Model
IVV-modell
IVV-NRWF
Langfrist prognose model
mobiliteitsverkenner (MOVE)
Model for Province of Antwerpen (passenger model)
National Danish Road Traffic Model
National Passenger Traffic Demand Model
National Passenger Transportation Model
New Regional Model (NRM)
NMT-4
Passflow 2000
Prometeia
Road Transport Model of Hungary
SAMI
SAMPERS
SAMPLAN
SAS
Scenario Explorer (Scenarioverkenner)
SMART 2.0
T-MESO
The Climate Model
The model owned by Directorate of Public Works
The Netherlands National Model System (LMS)
Transport Model for Poland
Transway
Urban and Regional Planning Support Model

Regional models – Freight 2-2

ATTACK
Freight Transport (Czech Republic)
GODMOD
Great Britain freight model
NATFRE.10
NEMO
PACE-FORWARD
PAWN
POINT
Prometeia
Quinquin Fret
Road Fund Model
SAMI/SANI
SMILE
STAN
STAN (Norway)
Strategic forecasts for freight and passenger by Flem
Strategic freight forecasting model for Germany
Sweden, SIKA
TEM II
TMP
Transport model for Poland
Vegdirektorat model
VP-WEG
WFTM

Regional models – Freight and Passenger 2-3

Austrian passenger/freight models
Danish road traffic model
EUNET Assessment model
Flexible Simulation Study Tool (FLEXSYT-II)
LMS
MOBILEC
NRM Groeimodel
OEST France (passenger/freight models)
SIMPT (Sistema Informativo per il Monitoraggio e la P
SISD
TRULS

National models including international – Passenger 3-1

Alsace Model
Bauconsult model
VM-PFV

National models including international – Freight 3-2

Bundesfernstrassen
BVWP Freight Transport Model
COMBI FEEDER MODEL
Combined Transport Model
Distribution coast model
E3ME
East Branch of East/West corridor
Ecotec
ETRAFREIGHT
EVOTRANS (Belgium)
Fehmarn Belt Freight Model
GPVTI
GVF -modell
ISG
Lincost
Market share model
Module Transport Nonurban de Marchandises
NEMO
Polydrom/SICO
Prognos Goods Transport Forecast Model
SAM (Simet Macro Model)
SAMGODS
Short sea shipping model
SIMU-GV
SNCF
T-Network
Trans European North South Motorway Corridor
TRANSEURO
Transportmittelwahlmodell
TRANSWAY

National models including international – Passenger & freight 3-3

East West traffic model of Denmark (Denmark)
Gravity Model for International Traffic

International models –Passenger 4-1

Brenner model
Bundesland OberOsterreich
HGV model
HSL Substitution Model
MAP-1
MATISSE-INTRAPLAN TRAFFIC AND PROFITABILITY FOR A WES
MATISSE
North Western Europe Model
SAX++.NET
Scandinavian Transport Model
T-NETWORK

International model –Freight 4-2

EUFRANET
NEAC
SIMIQ
SIMTRANS
STEMM - Freight

International model freight and passenger 4-3

ASTRA
OD Estim
Oeresund Traffic Model
SCENES 10-11-12 Model System
STEEDS
STREAMS
Ten Corridors of Helsinki freight and passenger data

Not known 0-0

Annex 2
Glossary for MDir variables

GLOSSARY *(for filling MDir)*

When answering the questions, please indicate:

Questions about the model	Interpretation
Model's name	*The official title of the model (acronym, if any)*
Abstract	*A very concise summary, that gives the main idea about the model, its application scope, the basic construction principles and the added value*
Policy relevance	*Which policies the model can be useful for*
Geographical Scale	*The actual geographical coverage of the model (for instance, European, international, regional, national, local etc)*
Time Horizon	*For the forecasting model:* *the latest base year , if any* *the forecast year(s), if any* *or the time span possible to forecast*
Scope of the model	*Strategic, tactical, operational, DSS,*
Transport domain	*Which domain(s) of transport the model is dealing with*
Intermodality	*If yes, then what particular transport modes are included*
Type of transport modelling formulation	*The underlying main assumptions or approaches, the basic parts of the model*
Integration with other forecast models	*Which other forecast models it has been used in combination with, if any*
Integration with evaluation tools	*Which evaluation tools the (sub)results of the model are used for*
Integration with decision tools	*Which decision tools the (sub)results of the model are used for*
Modeller	*The name of the company(ies) or person(s) who developed the model*
Proprietor	*The owner of the model*
Status	*e.g. public, non-public*
Applications	*The cases and/or the areas, if any, the model has been or can be applied for*
Legal Aspects	*The legal aspects of importance, for instance which organizations are authorized to use the model etc*
Commercial Aspects	*The commercial aspects of importance, for instance, can the model be purchased or accessed etc*
Input Database structure	*Input data or variables*

Questions about the model	Interpretation
Network definition	*If relevant, the network type, number of links and nodes, the level of details, the networking criteria*
Zoning	*If relevant, the territorial units used as zones, the (approximate) total number of zones, specific zoning criteria*
Organizational network	*If relevant, the criteria used for the public transport*
Surveys	*If any, which survey(s) information was used for input or validation of the model*
Traffic counts	*If any, what specific counts data are used in the model*
Socio-economic data	*If any, what specific socio-economic data are used in the model*
Base matrix	*Features of the base matrix(ces) of the model*
Generalized Cost functions	*If any, what variables the cost functions consist from, what are the other relevant aspects*
Type of users and units	*The units and dimensions used in the model*
Trip purposes	*If relevant for passenger models, how many and what trip purposes are considered in the model*
Time values for user and trips	*What time values are considered in the model (for instance annual, monthly, weekly, daily, peak hours etc*
Network calibration process	*If relevant, what kind of data and techniques are used as conditions for calibration of the network(s)*
Trip Generation	*What specific assumptions and parameters underlie the trip generation modelling and analysis*
Trip Distribution	*What particular methods and approaches are used in modelling the trip distribution (for instance, the gravity distribution model, entropy-maximization approach, etc)*
Modal Split	*If relevant, the techniques used for modelling the modal split*
Other O/D Matrix projection issues	*Any other aspects relevant in projection of O/D matrices*
Scenarios: Exogenous hypothesis	*The exogenous scenario(s) and/or hypothesis applied in the model, if any*
Periodicity	*What specific periodicity factor is used in the model*
Assignment	*What assignment methods and techniques are used in the model (all-or-nothing, stochastic methods, congested assignment etc)*
Sensitivity test	*What kind of sensitivity test(s) are or can be performed in the model*
Type of the results	*What type of the results the model produces*
Output Database structure	*What are the main aspects of the output database*
Audits	*If any, what particular audits*
Literature	*Literature upon which the model was based*

Questions about the model	Interpretation
Modelling software	*i.e. EMME/2, POLYDROM, (Micro)TRIPS, MINUTP, PTVision, SATRURN, QVIEW, Pascal/Delphi etc*
Statistical software	*i.e. SPSS, ALOGIT, EXCEL etc*
Database software	*i.e. Access, FoxPro, Visual Basic etc*
GIS software	*i.e. ArcView, ArcInfo, MapInfo etc*
Hardware and OS	*Minimum criteria for the hardware and operational system*
Expected Running time	*Approximate time necessary to run the whole model*
Usability	*Is model description available, in what language(s), what kind of expertise is necessary to run the model and understand the output results*
Planned improvements	*If any, what particular improvements are planned for the future*
Validated by proprietor	*Was the model fully or partly validated in terms of the produced results*
Validated by scientific committee	*Was the soundness of the scientific part of the model validated by the scientific committee*
Who filled this form	*Name of the person who filled the form*
Evaluation	*What are the strengths and weaknesses of the model*

Hereafter a detailed description of each of the 57 variables.

1. Name
1.1 Model's name
2. Policy relevance
2.1 Abstract
2.2 Policy relevance
2.3 Policy variables
2.4 Geographical scale
2.5 Time horizon
2.6 Scope
2.7 Transport domain
2.8 Modes represented
2.9 Type of transport modelling formulation
2.10 Integration with other models
2.11 Integration with evaluation tools
2.12 Integration with decision tools
3. Accessibility
3.1 Modeller
3.2 Proprietor
3.3 Contact person
3.4 Status
3.5 Applications
3.6 Legal aspects
3.7 Commercial aspects

4. Input data

4.1 Input database structure
4.2 Network definition
4.3 Zoning
4.4 Organisational network
4.5 Surveys
4.6 Traffic counts
4.7 Socio-economic data
4.8 Base matrix
4.9 Generalised cost functions
4.10 Type of users and units
4.11 Trip purposes
4.12 Time values for user and trips

5. Formulation

5.1 Network calibration process
5.2 Trip generation
5.3 Trip distribution
5.4 Modal split
5.5 O/D matrix projection issues
5.6 Scenarios: exogenous hypothesis
5.7 Periodicity
5.8 Assignment

6. Outputs

6.1 Sensitivity test
6.2 Type of the results
6.3 Output database structure

7. Software & hardware

7.1 Modelling software
7.2 Statistical software
7.3 Database software
7.4 GIS software
7.5 Hardware and OS
7.6 Expected running time
7.7 Usability

8. Audits

8.1 Audits
8.2 Literature
8.3 Planned improvements
8.4 Validated by proprietor
8.5 Validated by scientific committee
8.6 Evaluation: strengths and weaknesses
8.7 Who filled in this form?

Annex 3

MDIR POLICY

VARIABLES AND CTP GOALS

CTP goals	Explanation
Maximise transport efficiency	Improved performance and development of each mode and their service level integration into a coherent transport system, socio-economic feasibility, improved comfort and level of service etc.
Improve transport safety	Vehicle and infrastructure safety, dangerous transports, driver education and behaviour, socio-economic feasibility, etc and behaviour, socio-economic feasibility, etc
Contribute to environmental improvement	Local air pollution, noise, severance, quality of built environment and landscape, socio-economic feasibility, etc.
Improve strategic mobility	Accessibility and European networks, nodal points, peripheral areas, missing links, etc.
Contribute to strategic environmental improvement	Greenhouse gases, ecological damage, use of energy resources, etc.
Contribute to strategic economic development	Regional economics, spatial planning considerations, etc.
Contribute to technology development	Innovation in transport technology and standards, telematics, etc.
Contribute to implementation of Single Market	Fair competition and pricing, technical harmonisation, etc.
Contribute to social dimension	Equity, working conditions, 'Citizens' Network', People with reduced mobility
Contribute to external dimension	Network development and integration, agreements, technical assistance and co-operation, etc.

Keywords
amount of vehicles
distance
execution quality
ownership of vehicles
vehicle costs
fleet
Commercial fleet
Territory of the company
Policy analysis

Policy effects
Policy measures
Policy options
Accessibility
population
non-local supply
fuel
capacity
congestion
corridor study
demography
dynamic traffic management
economic development
electronic devices in vehicle
emission
energy consumption
evaluation of alternatives of project studies
congestion costs
function, equipment and utilisation
noise nuisance
Commodity group
goods transport
Utilisation of surface
emission
infrastructure
intensities
interaction between transport means
influence of policy
costs
development of logistics
location of living and industrial area
Air pollution

effects of measure
Packages of measures
environment
environmental effects
Mobility
Restricted mobility measures
mobility development
motive
design
public transport
state incomes
parking measures
park size
park structure
person-kilometres
private incomes
pricing measures
forecast
real national income
travel budget
productivity
travel time
spatial planning measures
spatial development
scenario
shock-effect
velocity
social-economic changes
railway capacity
future studies
traffic dosing-system

tonkilometers
transactions
transport
variants
relations
traffic control
traffic operationality
traffic lights
traffic management
traffic throughput
(Traffic) safety