presentation to OpenTrack user meeting

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Zurich, January 24th 2008
An application of OpenTrack in the design of Veneto Regional Metropolitan Railway System

- foreword
- Veneto Region
- project features
NET Engineering S.p.A. is a dynamic Company which produces and supplies technical and management services in the field of civil engineering for customers in Italy and abroad.

NET Engineering today is a joint stock company which employs about 160 people, with offices in Monselice (30 minutes from Venezia), Roma, Mestre-Venezia, Napoli.
Our Company's mission is to provide optimal integration of competencies to respond to customers’ needs, studying, planning, designing and implementing projects in the following sectors:

- Land Use, Environment, City Planning
- Transportation
- Architecture and Real Estate Development
- Hydraulics and Water Cycle
- Consulting
NET International aims at the markets of Central and Eastern Europe, where a big portion of the EU investments for infrastructures will be dedicated to the Countries of recent or forthcoming entrance into the European Union.

In July 2007 NET International acquired the majority of Spiekermann, a German civil engineering group based in Dusseldorf, with about **250 FTE’s** and a **23 M€** turnover.

The combined size of **NET Engineering International** is now of about **400 FTE’s** and **45 M€** turnover.
An application of OpenTrack in the design of Veneto Regional Metropolitan Railway System

- foreword
- Veneto Region
- project features
Veneto Region: an overview

- 18.391 sq km
- 4.500.000 people
- population density: 245 people per sq km
A widespread urbanization

- 300 people/sq km
- 6000 people/sq km
1500 km of railway lines in the region
An application of OpenTrack in the design of Veneto Regional Metropolitan Railway System

- foreword
- Veneto Region
- project features
system design approach

- Socio-economic background
- Target and constraint

- Study area
  - Traffic zone

- Transport demand analysis and estimation

- Present supply analysis
  - Train line
  - Bus line

- Present traffic flow
  - Critical point

Project of an integrated operational model
- Operational model
- Interval train timetable
- Bus line timetable
- General system check

Mathematical model for the simulation
- Supply component
- Demand component
- Interaction demand/supply
- Impact evaluation

Check of:
- Level of service
- Capacity

Service choice

Needs
- Train
- Train*km
- Station
- Infrastructure
- Bus
- Bus*km
- Interchange
- Parking
- Technology

INTEGRATED FARE

INFORMATION FOR USERS
1. Study area

2. Zoning

3. Socio-economic data: population, students, workers, working places, schools, ...
168 traffic counts inside and outside the region, with 4,400 interviews to drivers

12,500 telephone interviews to people living in the region, concerning trips and transport modes

3,700 interviews to train passengers
**travel demand**

**Deplacements between provinces**

**Railway trips between provinces**
NET Engineering. Clear ideas

Travel demand

Linee di desiderio
Spostamenti totali tra province
30000 15000 15
postamenti nella fascia di 4 ore

Matrice degli spostamenti
Linee di desiderio tra i Comuni

2000 1000 500
Scala dei valori
Ora di punta del mattino

Deplacements
Between provinces
Traffic assignment to private network
Traffic assignment to private network
system planning approach

Socio-economic background

Target and constraint

Study area
Traffic zone

Transport demand analysis and estimation

Present supply analysis:
- Train line
- Rail line

Present traffic flow critical point

PROJECT OF AN INTEGRATED OPERATIONAL MODEL
- Operational model
- Interval train timetable
- Bus line timetable
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Mathematical model for the simulation
- Supply component
- Demand component
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Check of:
- Level of Service
- Capacity

Service choice

Needs
- Train, Train*km, Station, Infrastructure
- Bus, Bus*km, Interchange Parking, Technology

Integrated fare

Information for users
service features: high frequency all day long
service features: rational connections
service features: coordination with bus services
The design tool: **VIRIATO**

NET Engineering - Clear ideas
system design approach

PROJECT OF AN INTEGRATED OPERATIONAL MODEL
- Operational model
- Interval train timetable
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Check of:
- Level of Service
- Capacity

SERVICE CHOICE

NEEDS
- Train, Train*km, Station, Infrastructure, Bus, Bus*km, Interchange Parking, Technology

TARGET AND CONSTRAINT

Socio-Economic Background

INTEGRATED FARE

INFORMATION FOR USERS

MATHEMATICAL MODEL FOR THE SIMULATION
- Supply Component
- Demand Component
- Interaction Demand/Supply
- Impact Evaluation
MODE/SERVICE CHOICE:
timetable diachronic model

O/D Matrix for public transport
- Early arrival run
  - Private Car
  - Early Bus
  - Early Train
- Late arrival run
  - Late Bus
  - Late Train
passenger load for each single bus or train run

NET Engineering

Clear ideas

Chart showing passenger load distribution.
system planning approach

Socio-economic background

Target and constraint

Study area
Traffic zone

Transport demand
Analysis and
Estimation

Present supply
Analysis:
- Train line
- Bus line

Present traffic
flow
Critical point

Project of an integrated
Operational model
- Operational model
- Interval train timetables
- Bus line timetables
- General system check

Mathematical model
For the simulation
- Supply component
- Demand component
- Interaction demand/supply
- Impact evaluation

Check of:
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Service choice

Needs
- Train, Train*km, Station, Infrastructure
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Integrated fare

Information for users
We used OpenTrack to evaluate:

- the feasibility of a new local train timetable and its interaction with other trains (long distance, freight) in:
  - the principal nodes of the network (Venice, Mestre, Padova, Verona, ...)
  - the new high speed / high capacity line between Mestre and Padova
  - the new lines and the new stations layouts under construction in the Region

...
An example: the Venezia – Verona line
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Some numbers about the network

281 stations

8471 edges, 15812 vertexes, 3342 signals

268 lines, 162 pictures, 246 rectangles, 268 lines, 2027 texts