INFORMATION SYSTEMS for public transport company
the case of Trieste Trasporti S.p.A.

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ITS EXPERIENCES IN TRIESTE COMPANY

• NATIONAL RESEARCH COUNCIL “TRANSPORT PROJECT”:
  - Analysis and development of framework for planning and management of public transport network
  - First release of management software system

• TRANSMODEL PROJECT
  - Global implementation of the European standard ENV 12986
  - Follower in EU TITAN Project

• SOFTWARE DEVELOPMENT
  - In house design & development of TSpm software

• AVM system:
  - Real time fleet control in urban network
  - Customer information
Information Systems for TPL management

COMPANY POLICY

Operation offering
Driver scheduling
Vehicle scheduling
Personnel needs
Users needs
Competitive tendering

Integrate & control!

Information Systems

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Information systems for TPL

PLANNING

CUSTOMER CARE

DATA

MANAGEMENT

OPERATING
Information systems for TPL

NETWORK DESIGN
VEHICLE SCHEDULING
CREW SCHEDULING

TRANSMODEL
DATA

CREW ROSTERING
PAYROLL
TIMETABLE
INTERACTIVE VOICE RESPONSE
CONTRACT MANAGEMENT

REAL TIME MGT
AVL/AVM SYSTEMS

BUS STOP FORECAST
NEXT STOP VISUAL & VOCAL
INTERNET NEWS
OPERATING INFORMATION SYSTEM
in Trieste Trasporti S.p.A.

In Trieste Trasporti we decided to DESIGN, DEVELOP and INTEGRATE an own Operating Information System, called:

Transport Scheduling planning & management

TSpm
What is TSpm?

- It’s an Information System for the global planning and management of a public transport network
- It’s based on the European data standard called TRANSMODEL
- It uses the advanced web intranet/extranet technology

In TSpm there are the following functionalities:

- database Transmodel
- security multi user, multi session for single transaction/operation
- planning modules for assigning, scheduling, VSP, CSP, Rostering
- road network
- bus stop mgmt
- Operating balance for local authorities
- Control reports, on white sheet or module
- Driver absence mgr & payroll interface
- Data & function integration with AVM, Call Center, Internet/Intranet systems
- data & function integration with customer information systems

- MULTILINGUAL support (English & Italian)
What is Transmodel?

- Transmodel is a Conceptual Schema of a data Model for a generic public transport company

- The model is the result of some R&D European Project in Crive I and Drive II

- It was adopted like a European standard in 1997 (ENV 12896)

- All workpapers are public and available at www.transmodel.org

- Every software developer can implement the conceptual schema in the PHYSICAL DATA BASE STRUCTURE

- TSpm is COMPLETELY aligned to release 4.1.1 of Transmodel
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**TSpm: planning**

- *IperPath* (urban network)
- *AssEps* (extra urban network)

**Schedule** (line timetable)

- *Vsp* (Vehicle scheduling program)
- *Csp* (Crew scheduling program)

**TSpm**
TSpm: Standard architecture

\[ \sum_{i=0}^{n} \alpha_i \]

Algorithms:
- language: C e C++
- technology: MS COM/DCOM

Data:
- logic: TRANSMODEL v4.1.1 (ENV 12896)
- rdbms: ORACLE

Interface:
- user: MS Windows GUI
- data: ODBC
- communication: TCP/IP

Programs:
- os: Windows
- hardware: Intel 80x86
TSpm: System Architecture

- Remote Access Server
- Presentation level
- Business logic level
- Data level

Remote user (peripheral depot)

- Server Windows NT/2000
- Client Windows 95/NT/2000 ws
- RDBMS Oracle 8.06
- Software 32 bit ActiveX

- Transaction management (Microsoft MTS\(^\text{TM}\))
- Presentation by Web Server & browser (Microsoft IIS\(^\text{TM}\) + Internet Explorer\(^\text{TM}\))
- CAD Microstation 95/SE\(^\text{TM}\)
TSpm: Functional Architecture

DATA LOADER & CONTROL

SCHEDULING & PLANNING

OPERATION MANAGEMENT

REPORT & ANALYSIS

EXTERNAL INTERFACE

AVM, CALL CENTER, CUSTOMER INFORMATION, ...

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TSpm: Internet platform

- sharing information
- high level security for unauthorised access or data integrity
Data Loader & Control

INTELLIGENT TRANSPORT SYSTEM IN TRIESTE, ©2003
Output of planning modules

Alphanumeric timetable

Graphic timetable
Depot vehicles assignment

Road & maintenance obligation

INTELLIGENT TRANSPORT SYSTEM IN TRIESTE, ©2003
Drivers assignment
**Bus Stop Timetable (Bi Lingual)**

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**Virtual** keyboard for stranger characters

© 2003
New Internet site: CMS technology
Breaking news on PT, general info, etc.
Automatic Vehicle Monitoring in TT

- **GPS satellites**
- **On board Computer**
- **LAN - TCP/IP network**
- **Call center**
- **RX/TX radio**
- **Public network GSM**
- **PRIVATE MOBILE RADIO**
- **KIOSKS**
- **Electronic bus stops**
- **Information panels**
- **Centrale operativa**
- **D.R.T.S.**
- **Public network GSM**
- **Transmodel**

**INTELLIGENT TRANSPORT SYSTEM IN TRIESTE, ©2003**
Components of the AVM system

- On board computer with 2 Mb, short range & long range data link
- 166 bus controlled (today)
- 3 PMR radio channels: throughput of 300 messages/minute per channel - loss 4.800 bps
- 90 bus with passengers counting, 30 with visual announcement, 137 with voice announcement
- 4 electronic bus stop (36 by 2004)
- 3 information kiosks with touch screen
- 2 station information board
- 1 central operation room
- 1 central data base

INTELLIGENT TRANSPORT SYSTEM IN TRIESTE, ©2003
On board system

- On Board Computer
- Long range RX/TX
- Short Range RX/TX
- Alarm button
- Driver console & card reader
- Passenger counters
- Next stop voice announcement
- Next stop display
Central operation room

- Map localisation
- Operation abnormal situation
- Linear view of a line
- Estimated bus (without avm)
- Real timetable
- Bus stop forecast
Central operation room: security

- Pre coded alarm bar
- Driver operated or by alarm button (hidden)
- View of the "alarm point" and the new bus position
**Operation statistics and balance**

- **Bus stop data:**
  - scheduled time
  - real arrival time
  - real starting time
  - boarding people
  - alighting people

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**INFOSMART TRANSPORT SYSTEM IN TRIESTE, ©2003**
Electronic bus stop

- Next arriving time forecast
- Other useful messages
Information boards & kiosks
An open architecture for customer services

- Individual information
- Future terminal: palmtop, cell phone
- User Card for service request at bus stop
- Special users (school bus, disabled or diseased people)
Conclusions

• Information technology is a KEY FACTOR for QUALITY and EFFICIENCY improvement in TPL

• Implementing an Intelligent Transport System need a coherent and robust data base

• Radio communication in urban area is critical (need short and frequent messages)

• Costs will decrease only if standardisation and “on market” systems will grow

• Sharing goals among operators, local authorities and industry

PARTNERSHIP, NOT SUPPLIERS!