New Forms of Mobility for People and Freight: ITS Enabling Technologies and Innovative Solutions

Urban mobility: Italian and Polish innovative projects ITS systems for Municipalities - Part 2
Innovative ICT solution provider
- Staff: 230 (500+ Group Selesta-Softeco)
- Offices: Genoa (Hq), Milan, Naples
- Industrial & services markets
  - telco, energy, transport, finance & banks, ...

ITS solution provider
- Mobility of people and goods
- Flexible transport solutions
- Infomobility

Strong orientation to research & innovation
- 40+ projects, 150+ RTD partners, ...
Mobility services for people and goods

- A strategic component of urban development
- Challenging problems
  - traffic congestion, energy consumption, environmental impacts ...
  - increasing variability of demand, change of user habits, ...
- Traditional responses
  - ill suited to the changing travel patterns
- Need for better adapted measures
  - Increased dynamics, improved efficiency
  - customer-oriented, attractive, high quality services

Flexible Transport Services (FTS)

- FTS = transport services that try to **adapt** the service **towards the actual needs of the user**

- Core functions of FTS:
  - **Knowledge acquiring** function: who needs what?
  - **Analysis function**: how to respond to this need?
  - **Dispatching function**: who to tell to take the action?

A closer loop ....
Flexible Transport Services (FTS)

FTS: different concepts and implementations

- Collective Transport services
  - Demand Responsive Transport (DRT)
    - *aka* dial-a-ride, dial-up bus, jitneys, paratransit, ...
    - currently, the main form of FTS for passengers
  - Car pooling, car sharing
  - Shared taxis
  - ....

- Logistics and freight distribution
  - Demand-driven (by nature)
  - Innovative B2B, B2C schemes
Flexible Transport Services (FTS)

An **intermediate** transport scheme

**End-user perspective**

<table>
<thead>
<tr>
<th></th>
<th>Number of users on board</th>
<th>Average response / waiting time</th>
<th>Average travel time</th>
<th>Cost for the customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular taxi</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>3</td>
</tr>
<tr>
<td>Shared taxi / minibus</td>
<td>●●</td>
<td>●●</td>
<td>●/●</td>
<td>●</td>
</tr>
<tr>
<td>DRT</td>
<td>●/●</td>
<td>●/●</td>
<td>●/●</td>
<td>●/●</td>
</tr>
<tr>
<td>Regular bus</td>
<td>●●●●</td>
<td>●●/●●</td>
<td>●●●●</td>
<td>●</td>
</tr>
</tbody>
</table>

(source: EU FAMS project, 2002; [http://www.famsproject.com](http://www.famsproject.com))
DRT: basic operation model

- General service scheme
  - Flexible route and schedule
  - Dynamically determined by demand

1. trip request
2. service offer
3. confirm / refuse
4. update trip plan

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### DRT: elements of flexibility

<table>
<thead>
<tr>
<th>Element</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booking</td>
<td>long term reservations</td>
<td>short term booking</td>
<td></td>
</tr>
<tr>
<td>Route</td>
<td>fixed months in advance</td>
<td>fixed shortly before trip</td>
<td></td>
</tr>
<tr>
<td>Vehicle</td>
<td>limited periods of availability</td>
<td>long periods of availability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 type</td>
<td>many types</td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>commercial</td>
<td>competitive tender</td>
<td>selected 1 hour before trip</td>
</tr>
<tr>
<td>Passenger</td>
<td>special transport services</td>
<td>general public only</td>
<td>no restrictions</td>
</tr>
<tr>
<td>Payment</td>
<td>pay on vehicle</td>
<td>season ticket</td>
<td>smart card</td>
</tr>
</tbody>
</table>

*increasing demand responsiveness*

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adapted from *Good Practice Guide for DRT Services using Telematics*
J.F. Brake, C. Mulley, J.D. Nelson, TORG, University of Newcastle, 2006
DRT: different service schemes

routes with pre-defined stops, deviations on demand

free routes, pre-defined stops on demand

completely free routes, non-predefined stops on demand (e.g. addresses)

combined schemes

end point (route terminus)

fixed intermediate stop

pre-defined stop point, on demand

non predefined stop point, on demand

pre-defined route element

non pre-defined route element
DRT: supporting ICT and ITS

- **Travel Dispatch Centre (TDC)**
  - booking, dispatching sw
  - optimisation sw
  - dispatching, monitoring (tracking) sw

- **Communications system**
  - TDC – vehicles (GPRS, UMTS, WiFI, PRN)
  - TDC – users (passengers) (web, SMS, IVR, ...)

- **Vehicle location, positioning**
  - GNSS (GPS, EGNOS/Galileo), digital maps

- **In-vehicle devices**
  - Driver support terminal

- **Payment**
  - e-tickets, NFC, ...
DRT: general ITS Architecture
Survey conducted within the CONNECT project (2006)

<table>
<thead>
<tr>
<th>Category</th>
<th>Open DRT (for general public use)</th>
<th>DRT for users with special needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large scale DRT service providers (&gt;1 M trips/yr)</td>
<td>Netherlands (1) – integrated with special needs, about 50/50</td>
<td>Finland (1), Netherlands (1) Sweden (4), UK (3)</td>
</tr>
<tr>
<td>Many (&gt;10) FTS schemes</td>
<td>Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Sweden, UK</td>
<td>Denmark, Finland, France, Italy, Netherlands, Norway Sweden, UK</td>
</tr>
<tr>
<td>Some individual FTS schemes</td>
<td>Austria, Ireland, Switzerland</td>
<td>Belgium, Germany, Ireland, Luxembourg, Switzerland</td>
</tr>
<tr>
<td>Little or no FTS</td>
<td>Czech, Cyprus, Estonia, Hungary, Greece, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Romania, Spain, Slovakia, Slovenia</td>
<td>Austria, Czech, Cyprus, Estonia, Hungary, Greece, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Spain, Slovakia, Slovenia</td>
</tr>
</tbody>
</table>

**DRT example: Genoa (IT)**

**Genoa**
- urban / peri-urban (3 areas)
- local area feeder services
- reservation and on-demand services

*Courtesy AMT Genova*
DRT example: Genoa (IT)

The Travel Dispatch Centre at AMT

DRT vehicle

The driver's terminal

courtesy AMT Genova
**Krakow**
- peri-urban area
- local *area feeder service*
  - connection with main lines to/from city centre
  - replacement of two existing lines
- reservation and on-demand services

**courtesy MPK Krakow**
City logistics: increasingly **demand-** and **policy-driven**

- Constraints / objectives of sustainability policies
  - Access restrictions for deliveries (e.g. historical centres)
  - Cooperative schemes (“consolidation”, transhipment)
- Integration (e.g. forward / reverse logistics)
- New B2B / B2C (flexible) services (**e-Logistics**)
- Interaction with e-Commerce
A mix of measures

- Restrictions policies to regulate freight deliveries
  - e.g. time slots, minimum load factor, ...
- Cooperation between freight operators
  - Transshipment / load consolidation at CDTs
- “Clean fleets”
  - CNG, hybrid, FEVs
- Delivery support services
  - e.g. on-demand L/U areas, delivery routing, ...
- Innovative B2C delivery schemes
  - e.g. delivery at hotels/parkings, goods collect points, etc.
- Efficient management of reverse logistics
- 3PL services
  - e.g. warehouse space rental
Example: city distribution in Lucca

Cooperative B2B scheme via City Distribution Terminal (CDT)

City of Lucca
- access restriction policy
- B2B delivery via CDT (electric vehicles)
- load consolidation
- value added B2C services
- reverse logistics
- supporting ITS / ICT platform
A dynamic scheme for access & distribution management

- **Policy**: access restriction (historical centre)
- **Target users**: shops/businesses, transport service providers
- **Goal**: sustainable/efficient distribution (less trips, same freight volumes)
- **Management tool**: monthly “freight credits”

**Shops/businesses** (own transport)
- **Spending credits**: each entrance/trip
- **Gaining credits**: online purchase
  - **Goal**: limited own deliveries, use 3rd party delivery services

**Transport service providers** (3rd party transport)
- **Spending credits**: each entrance/trip
- **Gaining credits**: each delivery, (online purchase)
  - **Goal**: load consolidation (increase deliveries per access/trip)
Full support to planning and operation of sustainable city distribution schemes

- City Distribution Terminal (CDT) operation services
- Forward/reverse logistics (“last mile” services)
- Value-added services (B2B, B2C)

Integrated ICT platforms

- Automated management of freight flows at CDT (goods check-in/check-out)
- Delivery planning and operation, route optimisation
- Tracking and Tracing
- Data communications (GSM, GPRS, WiFi)
- Delivery terminals (hand-held devices)
- End-user web services (City Logistics Web Portal)

Integration with other ITS

- E.g. Access Control, Enforcing, etc.
Flexible services (for people and goods)
  • an expanding sector of transport innovation

New solutions and application of ‘old’methods
  • made possible by enabling ICTs and ITS solutions

Niche and ‘traditional’ markets
  • DRT, car pooling, ...
  • City logistics

Mature technologies (deployment) but also opportunities for further expansion and research
  • Cooperative mobility systems (V2V / V2I comms, ITS standards, ref. Architectures, ...)

Conclusions