Sharing space, time and infrastructures in urban logistics
Contents

- City logistics a problem of sharing limited space
- The Novelog project lab: Turin metropolitan area
- Objectives and adopted methodology
- Urban Freight Traffic (UFT) in Turin
- Turin pilot outcomes
- Goodnews
Logistics in Rome 31 b.c.
Urban Logistics in Rome 2017

- Off Street Parking
- Coordinated Deliveries
- Reverse Logistics
- Reserved Parking Lot
- Door-to-Door Deliveries
- Transhipment Facilities
It is not only a Roman problem!
## Urban Freight Traffic is an issue

1. **contributes to urban challenges** (20% of traffic, 40-50% of GHG)

2. **embeds conflicts** (space/time, econ./environm., stakeholder views)

3. **highly context-specific & dynamic** (urbanisation, e-commerce)

4. **still heavily neglected in city/transport planning** (restrict vs assist)
The NOVELOG Project

NOVELOG – New Cooperative Business Models and Guidance for Sustainable City Logistics

- enabling of knowledge and understanding of urban freight distribution and service trips by providing guidance for implementing effective and sustainable policies and measures for sustainable city logistics.
- NOVELOG goes beyond the State-of-Art by employing a quadruple helix incorporating:
  1. evaluation framework development and data collection
  2. software tools supporting cities
  3. demonstrators and case studies
  4. guidelines for take-up
The NOVELOG Project in Turin

Sharing of public transport reserved lanes

Booking of loading/unloading docks

LTZ entrance

Dynamic infrastructure sharing
The Municipality of Turin has a population of 902,137. Population density ≈ 6,950 inhabitant /Km2

The motorization rate is approximately about 63% and overall trips on a working day are about 3,43 millions.

Trips per day per person are 2,44 (1,75 motorized).

Turin adopted a SUMP since 2008.

Turin is leading city in Italy in urban logistics having developed a set of push and pull measures dealing with restrictions and incentives for logistics operators delivering their operations in accordance with the Freight Quality Partnership (FQP) Agreement signed in 2013.
LTZ is the target area for NOVELOG pilot

2,58 km² with 37 gateways monitored by videocameras

2,400 shops, restaurants, bars  6 pedestrian streets  4 reserved bus lanes
NOVELOG target area statistics

### Demands of goods

<table>
<thead>
<tr>
<th>Category</th>
<th>Tons/day</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh food</td>
<td>30.3</td>
<td>8.3</td>
</tr>
<tr>
<td>Dry food</td>
<td>28.0</td>
<td>7.7</td>
</tr>
<tr>
<td>Groupage</td>
<td>100.9</td>
<td>27.8</td>
</tr>
<tr>
<td>Fashion goods</td>
<td>60.7</td>
<td>16.7</td>
</tr>
<tr>
<td>Hotel restaurant catering</td>
<td>143.3</td>
<td>39.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>363.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Vehicles entering in LTZ

<table>
<thead>
<tr>
<th>Category</th>
<th>Entrance in ZLT</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>EURO 0</td>
<td>34</td>
<td>0.33%</td>
</tr>
<tr>
<td>EURO 1</td>
<td>91</td>
<td>0.88%</td>
</tr>
<tr>
<td>EURO 2</td>
<td>806</td>
<td>7.76%</td>
</tr>
<tr>
<td>EURO 3</td>
<td>2.698</td>
<td>25.97%</td>
</tr>
<tr>
<td>EURO 4</td>
<td>5.070</td>
<td>48.81%</td>
</tr>
<tr>
<td>EURO 5</td>
<td>1.687</td>
<td>16.24%</td>
</tr>
<tr>
<td>EURO 6</td>
<td>1</td>
<td>0.01%</td>
</tr>
<tr>
<td><strong>Totale</strong></td>
<td>10.387</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>88.7</td>
</tr>
<tr>
<td>LCVs</td>
<td>7.4</td>
</tr>
<tr>
<td>Buses</td>
<td>2.0</td>
</tr>
<tr>
<td>Motocycles</td>
<td>1.9</td>
</tr>
</tbody>
</table>
Typology of vehicles and kind of business model

Private cars vs Freight

- **Private cars**:
  - EURO0: 0.0%
  - EURO1: 0.0%
  - EURO2: 10.0%
  - EURO3: 20.0%
  - EURO4: 30.0%
  - EURO5: 40.0%
  - EURO6: 50.0%

- **Freight**:
  - EURO0: 0.0%
  - EURO1: 0.0%
  - EURO2: 77.2%
  - EURO3: 22.8%
  - EURO4: 100.0%
  - EURO5: 0.0%
  - EURO6: 0.0%

**Pie Chart**

- **Self-owned**: 77.2%
- **Third party**: 22.8%
The NOVELOG pilot test: what we give

Novelog pilot allows logistics operators involved in the test to benefit of:

• Access LTZ from 6.00 to 24.00
• Access dedicated bus lanes
• Reserve loading/unloading parking lots
The NOVELOG pilot test: what we ask

Minimum requirements to join the recognition scheme are:

- **Low Emission Vehicles** compliant to Euro 5 standards or higher, with a gross vehicle weight below 3.5 tons (raised to 7.5 tons for ZEVs)
- **Embedded electronic devices** able to detect and transmit data regarding the location of the vehicle (i.e. GPS)
The NOVELOG methodology approach

Initial Plan

City’s Objective -> Data & KPI

Impact assessment of the City case

Comparison

Assessment after implementation
The expected impacts are:

- Traffic reduction
- Vehicle utilisation factor reduction
- CO$_2$ emissions reduction
- Accidents reduction
- Energy consumption reduction
## Impact assessment KPIs

<table>
<thead>
<tr>
<th>Module</th>
<th>Impact Areas</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact assessment</td>
<td>Mobility</td>
<td>Customer satisfaction; Traffic throughput; Vehicle utilisation factor;</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>CO2 emissions</td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td>Accidents; Violations</td>
</tr>
</tbody>
</table>
The NOVELOG pilot framework

Pilot study involved 80% of the overall couriers fleet for 6 months.
<table>
<thead>
<tr>
<th>Module</th>
<th>Impact Area</th>
<th>KPI</th>
<th>Data collected</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Assessment</td>
<td>Mobility</td>
<td>KPI 51 (Customer satisfaction)</td>
<td>Rate (Likert scale 1-5)</td>
<td>“Before” data no available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KPI 61 (Traffic throughput)</td>
<td>• Number of shipments • Average distance of a drive</td>
<td>Average distance of a run was based on estimations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KPI 63 (Vehicle utilisation factor)</td>
<td>• Number of load/unload stops • Average time of drive</td>
<td>The number of load/unload stops was based on estimations.</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>KPI 43 (Total CO2 emissions)</td>
<td>Per type of vehicle: • distances traveled • fuel type • average emission produced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td>KPI 53 (Accidents)</td>
<td>• Number of accidents • Total veh-km</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KPI 60 (Violations)</td>
<td>• Number vehicles performing illegal movements (e.g. illegal parking and / or access in LTZs) • Total number of movements</td>
<td>Data available from questionnaire survey to express couriers</td>
</tr>
</tbody>
</table>
## Methods applied and KPIs

<table>
<thead>
<tr>
<th>Module</th>
<th>Impact Area</th>
<th>KPI</th>
<th>IA Method applied</th>
<th>KPI data/units</th>
<th>KPI values (Before</th>
<th>After)</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Assessment</td>
<td>Mobility</td>
<td>KPI 51 (Customer satisfaction)</td>
<td>Questionnaire survey</td>
<td>Likert scale</td>
<td>2</td>
<td>4</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KPI 61 (Traffic throughput)</td>
<td>Average distance run x number of vehicle trips per day</td>
<td>Veh-km/day</td>
<td>107,8</td>
<td>98,2</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KPI 63 (Vehicle utilisation factor)</td>
<td>Number of load/unload stops per day x average time of drive</td>
<td>%</td>
<td>65,3</td>
<td>49</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>KPI 43 (Total CO2 emissions)</td>
<td>CO2 emissions evaluated with mathematic formulas considering type of vehicle, distances, fuel type, average emission produced</td>
<td>kg</td>
<td>27,420</td>
<td>24,930</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td>KPI 53 (Accidents)</td>
<td>Questionnaire survey</td>
<td>Number / veh-km</td>
<td>4</td>
<td>0,5</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KPI 60 (Violations)</td>
<td>Questionnaire survey</td>
<td>%</td>
<td>10</td>
<td>0</td>
<td>Positive</td>
</tr>
</tbody>
</table>
Outcomes from pilot

The results achieved by this pilot case are very positive since all of the impact area’s objectives were fully reached and most of them manage to overcome the initial targets.

The innovative aspect of this project is to plan transport with a holistic approach: shared lanes for both passengers and freights.

Loading/unloading exclusive parking facilitated couriers in their deliveries.

This system was managed by access control with already installed cameras that was further enhanced for the monitoring parking booking.

All these initiatives fostered a more sustainable governance model.
Outcomes from pilot

Logistics operators agree to invest on their freight business in return of more flexibility in day by day operations.

The new governance model is based on the possibility to give benefits in change of fleet improvement instead of restrictions.

The implemented measures demonstrated significant environmental improvements as CO₂, pollutant emissions and traffic reduction (i.e. no lines at the LTZ gates to wait for the entry time window, freight vehicles travelled on bus lanes without affecting bus commercial speed).
Traffic throughput witnessed a 9% decrease.

Total number of vehicles also decreased about 25%.

Customer satisfaction after the pilot reached 4 on 5 a very satisfying score.

Shared bus lanes usage, reserved loading/unloading parking, flexible access into LTZ, on board unit networking are widely appreciated among logistic operators.
Carbon dioxide witnessed an important decrease around 9% (however not reaching the 20%) because as seen freight vehicles represent a small percentage of the total LTZ vehicles.
Significant positive impacts in terms of accidents and violations.

**Number of accidents** during this pilot decreased by approximately 88%.

**No violations recorded** during pilot due to the OBUs providing warnings to drivers and showing available loading/unloading parking areas, thus avoiding illegal stops.
After the pilot study and real life testing, the new governance model has been adopted by Turin Municipality on a permanent basis as LTZ access regulation for freight transport.

The new governance model has been included into Government Transport Planning Framework as best practice to be implemented at National level in all 15 Italian metropolitan areas.

The approach has been presented at Urban Mobility Expert Group at European Commission that stated “it is the most innovative and promising approach in city logistics management and we all must be inspired from it”.
grazie.
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