Urban Freight Initiatives: State of the Art and State of the Practice

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VREF Urban Freight Platform

• Funded by VREF, researchers from Chalmers and GU
• Research themes:
  – Urban freight and urban form
  – Urban freight operations and policies, future vehicle design and technology
  – Stakeholder engagement
• + Facilitating the dialogue and dissemination
  – Seminars, workshops, etc
  – Research briefs
  – E-Book
  – VREF Conference on Urban Freight
• Visit www.urbanfreightplatform.se for more information
VREF Conference on Urban Freight (17-19 October 2018)
Urban Freight Initiatives: State of the Art and State of the Practice
Acknowledgements

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  — NCFRP Project 38 – Improving Freight System Performance in Metropolitan Areas

• Co-authors: J. Holguín-Veras, J. Wojtowicz, M. Browne, Johanna Amaya, M. Jaller, C. González, D.G. Haake, and S.D. Hodge

• We are grateful for all the responses from experts around the world who took their time to answer the survey
Congestion problems are not new...

37th Street and 7th Avenue, New York City, 1945
Freight in metropolitan areas is growing...

- In the US, 80% of cargo has origins or destinations in top 100 metropolitan statistical areas
- Freight transported varies among metropolitan areas:
  - On average, 20-30 kg/person-day
- More people are moving to urban areas → needs for cargo increase
- Amount of cargo transported increases with income
  - Rising incomes → more challenges to the system
- E-commerce and short delivery times → less tons/ km traveled
What can the Public Sector do?
Federal government
City government
Shippers
State government
Carriers: Air, trucking, rail
Receivers
Other users: cars, buses, bikes...
Communities
Environmental agencies
Ports, airports...

Stakeholder Engagement
Supply
Major Improvements
Minor Improvements
Technologies and Programs
Pricing, Incentives, Taxation
Demand Management
Land Use Policy
Freight Demand / Land Use Management
Logistical Management
Pricing, Incentives, and Taxation
Traffic Management
Vehicle-Related Strategies
Parking / Loading Areas Management
On-Street Parking and Loading
Off-Street Parking and Loading
Access and Vehicle-Related Restrictions
Time Access Restrictions
Traffic Control and Lane Management
Cargo Consolidation
Intelligent Transportation Systems (ITS)
Last Mile Delivery Practices
What is known about these initiatives?
We asked experts and practitioners

- Survey designed and disseminated worldwide
- Conducted Summer 2017-Summer 2018
- Three sections
  - Contact information of respondent
  - Most familiar city
  - Assessment of each initiative using a Likert scale (3 levels)
    - Familiar?
    - Implemented?
    - Most positive impact
    - Most negative impact
- Impacts:
  - Congestion
  - Delivery Costs
  - Emissions
  - Safety
  - Livability
Descriptive Summary

70 complete responses

- Researchers: 86%
- Practitioners: 14%

Countries:
- Developed countries: 59%
- Developing countries: 41%

Regions:
- US-Canada: 18%
- Europe: 34%
- Asia: 16%
- Latin America: 19%
- Australia: 5%
- Africa: 8%
- Africa: 8%
Information collected from:
32 Countries
56 Cities

Most represented cities:
Rome and NYC: 4
Paris, London, Mexico City, Sydney and Brussels: 2
Results: Familiarity

• Most familiar approaches:
  — Traffic Management (75%)
  — Vehicle-Related Initiatives (74%)
  — Financial Approaches (69%)

• Most familiar initiatives:
  — Daytime Delivery Restrictions (92%)
  — Vehicle Size and Weight Restrictions (89%)
  — Freight Parking and Loading Zones (89%)

• Less familiar approaches:
  — Parking/Loading Areas Management (64%)
  — Logistical Management (65%)
  — Infrastructure Management (67%)

• Less familiar initiatives:
  — Vertical Height Detection Systems (43%)
  — Improved Staging Areas (49%)
  — Timeshare of Parking Space (54%)

Experts are more familiar with supply-side and regulation-based approaches
Results: Implementation

• Most implemented approaches:
  — Vehicle Related Strategies (41%)
  — Traffic Management (40%)
  — Infrastructure Management (40%)

• Most implemented initiatives:
  — Vehicle Size and Weight Restrictions (83%)
  — Loading and Parking Restrictions (68%)
  — Freight Parking and Loading Zones (67%)

• Less implemented approaches:
  — Demand/Land Use Management (27%)
  — Logistical Management (28%)
  — Financial Management (30%)

• Less implemented initiatives:
  — Exclusive Truck Lanes (6%)
  — Timeshare of Parking Space (12%)
  — Improved Staging Areas (12%)
### Implementation by country type

**US-Canada, Asia:**
1. Logistics
2. Traffic

**Europe:**
1. Traffic (high)
2. Logistics

**Africa:**
1. Financial
2. Infrastructure (high)

**Australia:**
1. Logistics (high)
2. Parking/ Loading (high)

**Latin America:**
1. Traffic
2. Financial

<table>
<thead>
<tr>
<th>Urban Freight Initiatives</th>
<th>USA-Canada</th>
<th>Europe</th>
<th>Asia</th>
<th>Africa</th>
<th>Australia</th>
<th>Latin America</th>
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<td>On-Street Parking and Loading</td>
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<td><strong>Total Parking / Loading Areas Management</strong></td>
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<tr>
<td><strong>Total Logistical Management</strong></td>
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<td><strong>Total Demand / Land Use Management</strong></td>
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<td><strong>30.0%</strong></td>
<td><strong>26.2%</strong></td>
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</tbody>
</table>
Results: Impacts

• Positive Impacts of Initiatives
  - 63% → Improve Congestion – Significantly or Slightly
  - 18% → Reduce Emissions – Significantly or Slightly
  - 18% → Improve Livability – Mostly Slightly

• Negative Impacts of Initiatives
  - 63% → Increase Delivery Costs – Significantly or Slightly
  - 27% → No negative effect
  - 9% → Detriment in Livability – Slightly

• No Positive Effect
  - Nighttime Delivery Bans (32%)

• No Negative Effect
  - Real Time Information Systems (94%)
  - Recognition Programs (90%)
Results: Ranking of initiatives

- Given the diverse trade-off, a multi-attribute value function was developed to produce a ranking that considers both the community objective and the freight industry objective, and merge them into a society objective

\[
S_i = \sum_j w_j \left[ \left( w_{n_{i,j}}^{\text{slight}} + w_{n_{i,j}}^{\text{signif}} \right) - \left( w_{n_{i,j}}^{\text{slight}} - w_{n_{i,j}}^{\text{signif}} \right) \right]
\]

- The following weights were used to build the value function

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Magnitude of Impact</th>
<th>Weight</th>
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<tr>
<td>Congestion</td>
<td>9</td>
<td>None (No Effect)</td>
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<tr>
<td>Safety</td>
<td>8</td>
<td>Slight</td>
<td>1</td>
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<tr>
<td>Livability</td>
<td>8</td>
<td>Significant</td>
<td>3</td>
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<tr>
<td>Emissions</td>
<td>7</td>
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<tr>
<td>Delivery Costs</td>
<td>5</td>
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</table>

- Initiatives are divided by the scope of their impacts
## Results: Ranking of initiatives

<table>
<thead>
<tr>
<th>Initiatives with Local Impacts</th>
<th>Society</th>
<th>Community</th>
<th>Freight Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrade Parking/Loading Docks</td>
<td>Time Slotting of Deliveries</td>
<td>Parking Reservation Systems</td>
<td>Ramps for Handcarts and Forklifts</td>
</tr>
<tr>
<td>Parking Places and Loading Zones</td>
<td>Upgrade Parking/Loading Docks</td>
<td>Parking Places and Loading Zones</td>
<td>Upgrade Parking/Loading Docks</td>
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<td>Parking Reservation Systems</td>
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<tr>
<td>Time Slotting of Deliveries</td>
<td>Parking Reservation Systems</td>
<td>Remove Intersection Constraints</td>
<td>Ramps for Handcarts and Forklifts</td>
</tr>
<tr>
<td>Timeshare of Parking Space</td>
<td>Timeshare of Parking Space</td>
<td>Timeshare of Parking Space</td>
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<tr>
<td>Remove Intersection Constraints</td>
<td>Vertical Height Detection Systems</td>
<td>Parking Reservation Systems</td>
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<tr>
<td>Ramps for Handcarts and Forklifts</td>
<td>Remove Intersection Constraints</td>
<td>Time Slotting of Deliveries</td>
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<td>Vertical Height Detection Systems</td>
<td>Ramps for Handcarts and Forklifts</td>
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### Initiatives with Areawide Impacts

<table>
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<th>Traffic Control</th>
<th>Low Emission Zones</th>
<th>Exclusive Truck Lanes</th>
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</thead>
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<tr>
<td>Low Noise Delivery Programs</td>
<td>Low Noise Delivery Programs</td>
<td>Pick-up/Delivery to Alt. Locations</td>
</tr>
<tr>
<td>Enhanced Building Codes</td>
<td>Engine-Related Restrictions (*)</td>
<td>Off-Hour Deliveries</td>
</tr>
<tr>
<td>Off-Hour Deliveries</td>
<td>Enhanced Building Codes</td>
<td>Acceleration / Deceleration Lanes</td>
</tr>
<tr>
<td>Low Emission Zones</td>
<td>Urban Consolidation Centers</td>
<td>Traffic Control</td>
</tr>
<tr>
<td>Peak-Hour Clearways</td>
<td>Traffic Control</td>
<td>Receiver-Led Consolidation</td>
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<tr>
<td>Engine-Related Restrictions (*)</td>
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<td>Restricted Multi-Use Lanes</td>
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<td>Parking Pricing</td>
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<td>Parking Pricing</td>
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## Results: Ranking of initiatives

### Initiatives with Metropolitan Impacts

<table>
<thead>
<tr>
<th>Initiatives with Metropolitan Impacts</th>
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<td>Driver Training Programs</td>
<td>Driver Training Programs</td>
<td>Real Time Information Systems</td>
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<tr>
<td>Integrate Freight in LU Planning</td>
<td>Operational Incentives for E/LEV</td>
<td>Dynamic Routing</td>
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<tr>
<td>Improved Staging Areas</td>
<td>Certification Programs</td>
<td>Freight Clusters (Freight Village)</td>
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<tr>
<td>Freight Clusters (Freight Village)</td>
<td>Integrate Freight in LU Planning</td>
<td>Anti-Idling Programs</td>
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<td>Mode Shift Programs</td>
<td>Road Pricing</td>
<td>Improved Staging Areas</td>
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<tr>
<td>Truck Stops / Parking Outside</td>
<td>Improved Staging Areas</td>
<td>Integrate Freight in LU Planning</td>
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<tr>
<td>Relocate Large Traffic Generators</td>
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<td>Truck Stops / Parking Outside</td>
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### Initiatives with Regional Impacts

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## Differential effects (1/2)

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### Differential effects (2/2)

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<td>Integrating Freight into Land Use Planning</td>
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Stakeholder engagement

• Understanding and outreach are the critical defining tenets of good governance
• Effective engagement of the private sector requires mechanisms to discuss freight issues with private sector and communities
• Some mechanisms:
  – Designate a “Freight-Person” at Key Agencies
  – Create a Freight Advisory Committee (FAC)
  – Educate Elected Officials
  – Create a Technical Advisory Committee (TAC)
  – Consider Freight Quality Partnerships (FQP)
  – Foster an Industry-Led Best Practices Dissemination Program
Closing Remarks
Final thoughts

• Improving freight system performance is needed

• There is a wide range of initiatives
  — Multi-prong approaches are key
  — Every situation is different, local conditions matter…

• Trade-offs must be analyzed. If congestion improves delivery costs may increase. A balance should be reached

• Some under-utilized initiatives have great potential

• Some combination of initiatives can compensate differential effects

• Traditional initiatives have not provided the best impacts. Even if practitioners are familiar with them, implementation does not always take place
We Need to ...

- Undertake a holistic transformation of supply chains, inducing changes in behavior at key agents
- Embrace collaborative approaches involving all key stakeholders, there is a space for collaboration
- Transform existing freight policy and embrace innovation in urban freight: New trends, technology
- Use the tools available...
Questions?

Reference Materials:
Planning Guide: PDF version

Planning Guide: Interactive version
http://coe-sufs.org/wordpress/ncfrp33

Initiative Selector:
http://coe-sufs.org/wordpress/InitiativeSelector

Papers:

### Most Positive Impacts (supply side)

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<tr>
<th>Urban Freight Initiatives</th>
<th>Obs</th>
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<th>Delivery Costs</th>
<th>Congestion</th>
<th>Emissions</th>
<th>Safety</th>
<th>Livability</th>
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Most positive impacts (supply side)

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| Time Access Restrictions | Daytime Delivery Restrictions | 47  | 8.5% | 0.0%  | 66.0% | 0.0% | 6.4% | 19.1% |
|                         | Daytime Delivery Bans       | 37  | 16.2%| 5.4%  | 48.6% | 8.1% | 13.5%| 8.1%  |
|                         | Nighttime Delivery Bans     | 30  | 16.7%| 3.3%  | 23.3% | 3.3% | 3.3% | 50.0% |
| Total Time Access Restrictions | 114 | 13.2%| 2.6% | 49.1% | 3.5% | 7.9% | 23.7% |

| Traffic Control and Lane Management | Restricted Multi-Use Lanes | 23  | 0.0% | 8.7%  | 52.2% | 4.3% | 26.1% | 8.7%  |
|                                     | Exclusive Truck Lanes       | 24  | 4.2% | 33.3% | 20.8% | 0.0% | 33.3% | 8.3%  |
|                                     | Traffic Control             | 32  | 6.3% | 6.3%  | 75.0% | 0.0% | 9.4% | 3.1%  |
| Total Traffic Control / Lane Management | 79  | 3.8%| 15.2%| 51.9% | 1.3% | 21.5%| 6.3%  |
| Total Traffic Management            | 363 | 8.3%| 6.9% | 36.9% | 17.9%| 13.8%| 16.3% |
| GRAND TOTALS                        | 818 | 8.1%| 8.9% | 43.4%| 13.7%| 12.6%| 13.3% |
positive impacts (supply side)

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<tr>
<th>Urban Freight Initiatives</th>
<th>Obs</th>
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<th>Delivery Costs</th>
<th>Congestion</th>
<th>Emissions</th>
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