The Center of Excellence for Sustainable Urban Freight Systems (CoE-SUFS)

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What is the CoE-SUFS?

- A collaboration of leading UFS research groups:
  - Core Research Partners
  - Associate Research Centers

- Each city partner is a tripode:
  - Private sector
  - Public sector
  - Researchers
CoE-SUFS Goal

- To jumpstart an integrative process, involving cities, private sector, and researchers to develop new freight systems paradigms that:
  - Are sustainable
  - Increase quality of life
  - Foster economic competitiveness and efficiency
  - Enhance environmental justice
CoE-SUFS Network
Core Industry Partners (Selected)

- ATA
- ESC
- TNT
- TIC
- Truck Industry Council
  Canberra, Australia
  *Today’s Trucks: Safer, Greener, Essential*
- FTA
- CNT
- OOIDA
- DHL
Core Industry Partners (Selected)
Urban Freight Systems research is a new field, without a long tradition, new to most decision makers. 

- Without educating public sector decision-makers about what could be achieved, research funding will be limited...
- Without educating private sector about what could be achieved, their participation will be limited...
- Without educating researchers in related fields about what could be achieved, they will not do UFS research...
- Without educating all of them about what could be achieved they will not cooperate with the others...

Implications:
- Research must be locally driven, applied, to solve problems
- Over time, support for long-term basic research will appear
### Activities

<table>
<thead>
<tr>
<th>CoE-SUFS initiatives:</th>
<th>Main target:</th>
<th>Objective bring pursued:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Academia</td>
<td>Public sector</td>
</tr>
<tr>
<td>UFS Workshops</td>
<td>*</td>
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<tr>
<td>Peer-to-Peer Exchange</td>
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<tr>
<td>Working Groups</td>
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<tr>
<td>Research Projects</td>
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<td>Joint Proposals</td>
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<tr>
<td>Special Events (e.g., PASI)</td>
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<td>*</td>
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<tr>
<td>Equipment loans</td>
<td>*</td>
<td></td>
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<tr>
<td>Faculty/student visits</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Public sector visits</td>
<td></td>
<td>*</td>
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<tr>
<td>Student support</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Faculty travel support</td>
<td>*</td>
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<tr>
<td>Webpage</td>
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<tr>
<td>On-line courses</td>
<td>*</td>
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</tr>
</tbody>
</table>
Examples of Leveraging of Resources
NCFRP 33

- Interactive version: http://coe-sufs.org/wordpress/ncfrp33/
- Initiative Selector: http://coe-sufs.org/wordpress/InitiativeSelector/
- FTG Estimator: https://coe-sufs.org/wordpress/ncfrp33/appendix/ftg/

Freight flows are physical manifestations of the manufacturing and consumer economies that are foundations of modern life. Transportation policy seeks to ensure that freight is moved as efficiently as possible, as hampering the flow of cargo is bound to have a negative effect on the
Initiative 26: Restricted Multi-Use Lanes

**Description:** Promotes the use of available road capacity by allocating restricted lane right-of-way to trucks, buses, and occasionally high-occupancy vehicles. The lane usage can be allocated to different users using time windows; shared among designated users all day; or restricted to special use for certain users. Restrictions can be by vehicle type, or can allow mixed traffic during the restriction interval.

<table>
<thead>
<tr>
<th>Targeted mode: All traffic / large trucks</th>
<th>Geographic scope: Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of initiative: Traffic Management: Lane</td>
<td>Primary objective: Optimize road capacity</td>
</tr>
</tbody>
</table>

**Expected costs and level of effort to implement:** Lane management strategies and restrictions to multi-use lanes require thorough planning to consider the characteristics of the network, and the needs of different users. Planning should involve extensive stakeholder engagement, and weigh both the positive and negative impacts to all agents that are part of the system. The costs are mainly associated with the installation of variable message signs (VMS) or changeable message signs (CMS), and enforcement resources.

**Advantages:**
- Reduce congestion
- Enhance safety
- Increase efficiency
- Enhance livability
- Can be used as incentive to foster other strategies

**Disadvantages:**
- May confuse drivers
- May conflict with other traffic users
- May not be adequate for sensitive locations
- Hard to enforce
- Lane geometry may not be adequate for large trucks

**Examples:**
- Multifunctional lanes in its commercial center: Barcelona, Spain (City Ports, 2005)
- Clean vehicles are allowed to use public transport lanes: Göteborg, Sweden (START, 2009)
- Consolidation vehicles are allowed to use bus lanes: Bristol, England (START, 2009)
- Ban on through trucks on interstate inside the perimeter freeway, Georgia  

Source: (Federal Highway Administration, 2011)

**Related alternatives:** 1. Acceleration/Deceleration Lanes; 2. Traffic Control; 3. Dynamic Routing

**References:** (Ogden, 1992; City Ports, 2005; BESTUF, 2007; START, 2009; Georgia Department of Public Safety, 2010; Federal Highway Administration, 2011; SUGAR, 2011; The City of New York, 2012; North Carolina Department of Transportation, 2013).
UFS Workshops

Intended to:

- Educate decision makers and researchers about current state of the art/practice of urban freight policy/programs
- Grow the freight research community
- Create an international network of researchers/practitioners

Fourteen workshops have been held

- Tremendously influential, provide public-private-researchers with a path forward...
- In many cases, the workshops bring the local stakeholders together for the first time...
- Have spawned research and implementations

Participation: 1,230 participants → (20% public, 30% private, 50% researchers)
Other Workshops
Peer-to-Peer Exchange Program
Peer-to-Peer Exchange (P2P) Program

- Intended to:
  - Foster the transition of research ideas into practice
  - Highlight the potential of collaborative approaches involving public-private-research work

- Nineteen P2Ps have been held
  - Covering the entire range of approaches to improve UFS
  - With speakers from almost all continents (except Africa)

- Participation:
  - Per webinar:
    - 185-325 register, 100-150 logins, 20-25 countries
  - Total:
    - 4,000 registrants, 2,100 logins, about 35 countries
P2P Webinars

NEXT WEBINAR: DEC. 9, 2013
11AM EST
VREF CENTER OF EXCELLENCE FOR
SUSTAINABLE URBAN FREIGHT SYSTEMS
Peer-to-Peer Exchange Program

Lessons from the Off-Hour Delivery Program in New York City

NEXT UP

Urban Consolidation Centers:
The Good, The Bad, and the Ugly
The Japanese Experience

March 5th, 8 p.m. EST | March 6th, 10 a.m. JST
Professor Eiichi Taniguchi Dr. Ali Qureshii

NEXT UP

Urban Consolidation Centers:
The Good, The Bad, and the Ugly
The Dutch Experience

March 31, 2014 :: 1:00 pm EST
Dr. Lorant Tavasszy Dr. Hans Quak Dr. Peter Tjelta

NEXT UP

Urban Consolidation Centers:
The UK Experience

May 6, 2014 :: 11 a.m. EST
Professor Michael Browne, University of Westminster Jose Halquin-Varas Rensselaer Polytechnic Institute

NEXT UP

Logistics Sprawl:
Spatial patterns of logistics facilities and their impacts on metropolitan areas

July 22, 2014 :: 11:00 EST
Laetitia Dabiano, MetroFreight/FST/IAR Anne Goodchild, University of Washington
P2P Webinars

**Next Up**

**Freight Trip Generation Patterns in Developing Countries:**
The Cases of Chennai, India, and Medellin, Colombia

- Ivan Sarmiento, Universidad Nacional de Colombia at Medellin
- Gita Krishnan Ramadurai, Indian Institute of Technology at Madras

*September 24th, 2014 :: 10 am – 11 am (EST)*

**Trip Generation Patterns in Developed Countries:**
The cases of United States and Portugal

- Miguel Jaller, University of California - Davis
- Ivan Sanchez, Chalmers University of Technology
- André Alho, IST, University of Lisbon
- João de Alarcão e Silva, IST, University of Lisbon

*October 22nd, 2014 :: 11:00 EST*

**Engaging stakeholders in sustainable urban freight initiatives:**
An international perspective *

- Professor Michael Browne, University of Westminster
- Dr. Maria Lindsey, Chalmers University of Technology

*February 4, 2015 :: 11 a.m. EST*

**Role of High Productivity Freight Vehicles in Metropolitan Areas:**
The Australian Experience

- Kim Hassall
- Les Brazza
- Russell Thompson

*April 1, 2015 :: 4:00 pm EST*

**Cargo Cycles for Urban Freight:**
The European Experience

- Achim Beier
- Julius Menge
- Johannes Gruber

*June 10th, 2015 :: 11am (EST)*

**Cargo Cycles for Urban Delivery:**
The North American Experience

- Franklin Jones
- Alison Conway

*August 19, 2015 :: 11:00 am EST*
P2P Webinars

Updates on Off-Hour Delivery Pilots
*Part 1: The Experiences of Sao Paulo, Brazil and Copenhagen, Denmark*

April 14th, 2016 :: 11:00 a.m. EST

Hugo Yoshizaki, Claudio Barbieri da Cunha, Christian Frank, Kristian Kostrup

Updates on Off-Hour Delivery Pilots
*Part II: The Experience of Bogota, Colombia*

June 15th, 2016 :: 11:00 a.m. EST

Ana M. Zambrano, Sergio E. Martinez, Frank A. Ballesteros

Innovative Street Solutions for Urban Freight: Experiences from London and Buenos Aires

Sept. 14th, 2016 :: 11:00 a.m. EST

Juanjo Mendez, Jaz Chani

Use of Freight Trip Generation Techniques to Manage Curb Space

Dec. 14th, 2016 :: 11:00 a.m. EST

José Holguín-Veras, Eulaís Cleckley

The Impacts of Congestion on Supply Chains: Recent Results from an Inter-American Development Bank Initiative

Feb. 22nd, 2017 :: 11:00 a.m. EST

José Holguín-Veras, Pablo Guerrero

Logistics and Land Use Planning: The Example of Paris

June 21st, 2017 :: 11:00 a.m. EST

Laetitia Doblanç, Michele-Angélique Nicol
Collaborative Research
Current Projects (selected)

- “Methodology to Analyze and Quantify the Impacts of Congestion on Supply Chains in Latin-American Cities” (Inter-American Development Bank): with Univ. del Norte (Colombia), Univ. de Sao Paulo (Brazil), and Universidad Diego Portales (Chile)

- “Improving Freight System Performance in Metropolitan Areas” (National Cooperative Freight Research Program): with University of Westminster

- “Study of Freight Movement in Delhi” (VREF), with IIT-Delhi

- SHRP C-20 “Freight Demand Modeling Innovation” (Federal Highway Administration) with Capital District Transportation Commission
Impacts
<table>
<thead>
<tr>
<th>Before the CoE-SUFS:</th>
<th>After the CoE-SUFS:</th>
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</thead>
<tbody>
<tr>
<td>Partners only had sporadic collaborations</td>
<td>Collaborations have surged</td>
</tr>
<tr>
<td>Few collaborations developed/ing countries</td>
<td>Multiple collaborations are ongoing</td>
</tr>
<tr>
<td>Research dissemination to developed countries, not much to developing</td>
<td>Workshops and P2Ps have reached out developing countries</td>
</tr>
<tr>
<td>No way to foster city-to-city collaborations</td>
<td>Collaborations growing, e.g. NYC-London</td>
</tr>
<tr>
<td>Limited amount of visits from students and faculty with interest on UFS</td>
<td>VREF/CoE-SUFS funding has increased number of visits</td>
</tr>
</tbody>
</table>
VREF CoE-SUFS Activities with University of São Paulo

Prof. Hugo Yoshizaki
Prof. Cláudio Barbieri da Cunha
Center for Logistics Systems Innovation
University of São Paulo
Actions

- Workshop in São Paulo (2013)
Workshop in São Paulo (2013)
Workshop in July 2013

- **Venue:** University of São Paulo
  - USP/CISLOG: SUFS affiliate center
- **Strong presence from government and top private companies**
  - Director of the São Paulo Transit Authority (DETRAN)
  - President of Motor Carriers Syndicate (SETCESP)
- **Presentations:**
  - Academics: JHV, Taniguchi, Browne, Jaller
  - Companies: AMBEV, Martin Brower, Pão de Açúcar, DHL
  - Government: Traffic Engineering Department, São Paulo
- **Beginnings of the idea of an OHD pilot in São Paulo**
The Off-Hour-Deliveries Pilot Project
2014-2015
Highly successful OHD pilot in São Paulo

From Oct 2014 to Mar 2015
- Direct consequence from 2013 workshop.
- All volunteer companies: 11 companies, 45 stores.
- Neither noise nor security problems during the pilot.

Results
- Presented in urban logistics forum (including VREF CoE SUFS).
- Mayor: “freight should be considered as public transportation”.
- September 2015: Division of Urban Freight is created.
- OHD adopted as city policy by the mayor

Lessons
- Collaboration is important between public and private sectors.
- Role of the university in Latin America: privileged actor to catalyze both public and private sectors.
Results: Speed per hour

BoxPlot: Speed per hour - Express Ways

- Speed (Km/h)
- Hour

Average
Results: Speed per hour

BoxPlot: Speed per hour - ZMRC

- Average
Parking issues
Productivity and Costs - Day vs. Night

Travel time is shorter

Delivery time is not so shorter

Histogram: Travel time (hours)

Histogram: Delivery time (min)

Source: CISLOG 2015
VREF CoE-SUFS Activities with Universidad Nacional de Colombia at Medellin

Prof. Carlos A. Gonzalez-Calderon
Prof. Ivan Sarmiento
Prof. John Jairo Posada-Henao

Universidad Nacional de Colombia at Medellin
The VREF’ Center of Excellence for Sustainable Urban Freight Systems (CoE-SUFS) advises the Universidad Nacional de Colombia at Medellin (UNALMED) in the Freight Origin-Destination Survey Study for the Medellin Metropolitan Area (2013-2018) in two stages:

1. Analyses of Freight OD matrices (started in 2013)
2. Freight Study in the Medellin Metropolitan Area starting in November 2017 until August 2018
The Medellin Metropolitan Area

- Medellin is the second largest city of the country in terms of population and economy
- Produces 67% of the Department of Antioquia's GDP and 11% of the economy of Colombia
- The urban core, Medellin, concentrates 70% of the population and it is the seat of about 85% of the establishments, mostly related to commercial and manufacturing activities

- Metropolitan area: 10 cities
- 3.5 million inhabitants
- 67,800 commercial establishments
**Cordon survey:** 2,950 commercial vehicles. 11 tollbooths used around the area to capture:
- Origins and destinations
- Commodities transported (quantity, unit, weight, and industry sector)
- Commercial vehicle characteristics (vehicle type, vehicle configuration, number of axels, number of stops per tour, capacity, percentage of cargo transported, and load factor)

**Establishment survey:** 2,990 commercial establishments to characterize the cargo patterns

**Carrier interviews:** 10 companies/130 truck drivers. Done to validate practices and details of behavioral aspects of urban deliveries and logistics practices.
Type of Vehicle and Average Number of Stops

- 4% of the vehicles were light vehicles (cars, pick-ups)
- 11% small trucks, 71% medium trucks, and 14% large trucks
- 26% of the total trips are empty

Average No. of stops in MMA = 2.6
Average No. of stops in NYC = 8.0
### Daily Attraction and Production

<table>
<thead>
<tr>
<th>Industry classification</th>
<th>Trips/day</th>
<th>% of trips</th>
<th>Tons/day</th>
<th>% of tonnage</th>
<th>Kg/trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail trade</td>
<td>28,018</td>
<td>29.7%</td>
<td>1,200</td>
<td>19.8%</td>
<td>42.8</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>24,812</td>
<td>26.3%</td>
<td>1,317</td>
<td>21.7%</td>
<td>53.1</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>6,920</td>
<td>7.3%</td>
<td>763</td>
<td>12.6%</td>
<td>110.3</td>
</tr>
<tr>
<td>Construction</td>
<td>4,170</td>
<td>4.4%</td>
<td>300</td>
<td>5.0%</td>
<td>71.9</td>
</tr>
<tr>
<td>For hire carriage</td>
<td>2,361</td>
<td>2.5%</td>
<td>59</td>
<td>1.0%</td>
<td>25.0</td>
</tr>
<tr>
<td>Services</td>
<td>21,665</td>
<td>23.0%</td>
<td>695</td>
<td>11.5%</td>
<td>32.1</td>
</tr>
<tr>
<td>Utilities/communication</td>
<td>183</td>
<td>0.2%</td>
<td>7</td>
<td>0.1%</td>
<td>38.3</td>
</tr>
<tr>
<td>Public administration</td>
<td>12</td>
<td>0.0%</td>
<td>3</td>
<td>0.0%</td>
<td>250.0</td>
</tr>
<tr>
<td>Large freight generator</td>
<td>4,364</td>
<td>4.60%</td>
<td>1,577</td>
<td>26.0%</td>
<td>361.4</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0</td>
</tr>
<tr>
<td>Mining</td>
<td>1,528</td>
<td>1.6%</td>
<td>109</td>
<td>1.8%</td>
<td>71.3</td>
</tr>
<tr>
<td>Unclassified</td>
<td>151</td>
<td>0.2%</td>
<td>30</td>
<td>0.5%</td>
<td>198.7</td>
</tr>
<tr>
<td>Total</td>
<td>94,184</td>
<td>100.0%</td>
<td>6,060</td>
<td>100.0%</td>
<td>64.3</td>
</tr>
</tbody>
</table>

- 94,000 trips per day generated
- More than 6,000 tons transported between small establishments

- Retail and Manufacturing → Large amounts of trips and tons
- Services → Relatively large number of trips with small portion of tons
- Large Generators → Relatively few trips with large portion of tons
Other findings

- 71% of the establishments do not have a storage room → they need frequent deliveries
- 45% of the establishments open between 7:00-8:00 a.m., and 40% close between 5:00 and 6:00 p.m.
- 70% of trucks park in the street to load/unload cargo
- Average time to load/unload is 18.5 min

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>% Trips</th>
<th>% Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trucks</td>
<td>64.4</td>
<td>72.7</td>
</tr>
<tr>
<td>Pick-ups and vans</td>
<td>11.5</td>
<td>11.3</td>
</tr>
<tr>
<td>Cars</td>
<td>8.1</td>
<td>9.6</td>
</tr>
<tr>
<td>Motorcycles</td>
<td>10.4</td>
<td>4.7</td>
</tr>
<tr>
<td>Bikes</td>
<td>3.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Others</td>
<td>2.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Freight Cargo: 25 kg/person/day

Not conventional freight vehicles:
- 24.1 % of trips
- 16 % of tons
Medellin Metro Area Freight Study (2017-2018)

- **Dates of the study**: November 2017 - August 2018

- **Activities**

  1. Obtain Freight OD Matrix
     - Update 2013 Freight Study
     - Large Traffic Generators
     - Service Trips
     - Debris Trips

  2. Freight Demand Modeling
     - Freight Generation
     - Freight Trip Generation
     - Service Trip Generation

  3. Propose Freight Initiatives for the region
Thanks!