Bestufs WP3 Rome round table - Issues Part 3:

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METHODOLOGY FOR DATA COLLECTION

All European cities are faced to congestion, pollution and varied problem concerning the road use in urban areas. Decision makers have to referee different solutions in order to improve the quality of life of inhabitants at the same time as to decrease energy consumption, pollutant and greenhouse gas emissions. In order to reach objectives, adapted data are required. Numerous data collection concern individual behaviour. Concerning Urban Goods Movements (UGM), a large census realised, in the framework of WP3, to 70 experts in 11 different European countries, revealed the few available specific urban data. The summarising table shows 20 different types of data collection which should be used for urban logistics knowledge (M.Browne, J.Allen, 2006).

The main issues observed in Paris meeting were: (see minutes, 2007)

No consensus about methodology;
Standard data do not exist at urban scale;
Available data are not suitable with objectives;
Lack of reliability for urban goods data collection;
A problem with : Who has to pay the collection?

The difficulty lies in the complexity of urban logistics. Current data can't explain the behaviour of a great number of economical actors. The data collected concern mostly long distance goods traffic, inter-regional traffic, large vehicles, third part transport.

In order to approach those issues we shall try to answer 3 questions:

1. What's UGM data collection for?
2. Which indicators for which objectives? Which data help decision makers for understanding urban logistics mechanisms for planning and regulation?
3. Can available data answer the decision makers and models needs?

Question 1. What's UGM data collection for?

- First, the UGM data collections are useful to know the urban logistics functioning. They have to help decisions makers to reach the objectives they have for the city. Particularly, in order to solve main problems as congestion, pollution, safety, greenhouse effects gas emission, noise, and globally sustainability caused by the UGM.
- More, some UGM data collection are useful for UGM modelling (necessity of coherence, pertinence, measurability) in order
  - to do a diagnosis of UGM
  - to simulate impacts of planning or regulation decisions on the traffic generation
  - to anticipate traffic in a zone… without heavy surveys.
- At last, some UGM data are useful for models calibration.

The following table shows the need of knowledge face to these 3 requirements:

Need of knowledge	Objectives for decision makers
Contribution of each economical activity in UGM, Role of urban density (activities, employment) in distance covered for UGM, Quantification of number and type of vehicles involved in deliveries and pick ups, Role of organisation (round, direct trip) and management (own account, third part) in UGM traffic.	**UGM traffic calming** : (purchasing trips, business trips, supplying of establishments, goods movements for urban management (waste, postal, works)), **Decreasing of distances covered,** **Optimisation of urban supply chain,** (standardisation, regulation, urban logistics area fitting…)**,** **Equitable road sharing** (UGM, individual trips, public transports), **Decreasing of energy consumption and greenhouse gas and pollutant emissions.**

Effect of purchasing consumer behaviour on UGM.	Urban management, location of shops.
Effect of logistics places location and type of logistics place on traffic generation.	Regulation, parking places, delivery places, urban logistics area, platform location.

Table 2. Knowledge necessary for answering to objectives of city planners and model developers

Question 2. Which indicators for which objectives ?

The table 2 shows indicators which results of data collected in complex surveys (each indicator permits to answer objectives of UGM management).

Objectives	Urban freight indicators	N°	Units in which the indicator is measured
To know the contribution of each industry sector. Make possible a fast appraisal of the generation of deliveries and pick-ups in a town without any survey.	Number of Loading /unloading in each activity	1	Number of deliveries and pick-ups per employee per time unit
To measure the importance of the goods flows in a zone	Loading/unloading density in a zone	2	Number of deliveries and pick-ups per km²
To measure the contribution of each industry sector to the goods flows	Loading/unloading intensity per activity in a zone	3	Number of deliveries and pick-ups
To measure the contribution of each industry sector to the road congestion by the on street double parking deliveries	Loading/unloading time in a zone, per vehicle, per activity	4	Number of hours of on street double parking for delivery or pick-up
To measure the contribution of the running vehicles delivering each industry sector to the road congestion.	Distance covered for Loading/unloading in a zone, per vehicle, per activity	5	Number of kilometres covered for one delivery or pick-up
To measure the impact of the location of the platform delivering goods relating to its market radius	Average length of the first leg from platform to the delivery area	6	Km
To measure the contribution of one delivery/pick-up to the urban traffic (per type of involved vehicle)	Average distance travelled per pick up/delivery	7	Km per pick up or delivery
To measure the contribution of the total industry activity on the traffic.	Total distance travelled on roads in urban area transporting goods by HGV, rigid lorries, and LGV (<3,5T) used.	8	Total vehicle km
To measure the time taken for delivering in a tour, on a street, for an industry activity,…	Average time taken per delivery (per activity type, per vehicle, own account, for hire…)	9	Minutes per delivery
To measure the performance of the rounds for each way of organisation, type of vehicle.	Average speed per round (including and excluding stops to make deliveries) km/hour	10	Km per hour
To measure the performance of the rounds for each way of organisation, type of vehicle…	Average payload per kilometre per tour, per activity, per type of vehicle	11	Ton*km
To measure the road occupancy per hour	Number of vehicles involved in deliveries and pick ups per hour per type per size.	12	Number of vehicle /h.
To measure of the impact of urban goods movement on the energy consumption, local and global nuisance and greenhouse gas.	Greenhouse gas* and pollution according to the zone, the vehicle, the activity, the management	13	- g Pollutant per km - g CO2 per km - litre of fuel per km.

** ratio calculated thanks to speed, distance covered and payload per vehicle for delivery*

Table 2 : Urban freight transport necessary indicators

Question 3. quality of data for quality of indicators

Quality of indicators and models rest on quality of data collected in surveys. Efficiency of data depends on the choice of statistical unit observed. What unit provides information about how the main flows are generated and hence makes it possible to establish a link between economic activities and the congestion they cause in a conurbation ?
Considering *commodity trips* as observation unit, origin-destination of goods has no meaning in term of transport, because a ton of goods from *zi* to *zj* may be transported as a single payload in a direct trip with a heavy goods vehicle as well as hundred small parcels, some of them being delivered straightforward and some other delivered in complex rounds with light goods vehicles.
In order to observe the different ways of organisation on the road of a goods vehicle, other statistical units may be considered: monitoring of *a street segment* during a defined period may provide the parking place and time and the moving of the goods vehicles working on this segment. Surveying the *routes* of the goods vehicles provides a thorough description of the stops as they come. Through surveying *the shippers* all pick-ups and deliveries could be registered. Each of those observation units have drawbacks:

- The rules of sampling of street segment are difficult, makes not possible knowledge of link between congestion caused by these vehicles with economic activities that attract these vehicles;
- The routes may not be settled into the land use characteristics,
- Shipper surveys do not provide easily the routes characteristics.

Each of these units brings up difficulties (rules of drawing which permits the representativeness of the sample, possibility to link the observation with known urban statistics).
Taking into account these constraints, a receipt or a shipment or both, carried out by a vehicle making a pick up from or a delivery to an establishment named *movement* seems, for us, as being the most relevant unit for the survey. This choice also allowed us to circumvent the difficulties inherent in identifying the origin/destination flows which are one of the priority aims of the models usually encountered. Although goods have an identifiable origin and destination, the same is not true of the vehicles which transport them. In urban areas vehicles carrying goods tend to follow complex routes, involving a large number of movements in a single round. This is one of the main problems of designing models relating to urban goods transport.
An additional driver survey can be calibrated traffic generator (establishment) survey in order to have a comprehensive description of urban logistics and transport condition.

of traffic generators are more able to permit data collection about loading/unloading. A driver survey is very useful (time and parking place, link between activity and type of parcels and packaging…and itineraries followed).

4. What available UGM data in Europe? Are they useful for a diagnosis or modelling?

The table 3 summarises the type of data collected, their field of observation, the level of collect and their utility for planning and modelling.
The column “useful for UGM” gives the possibility to use the data for a part of UGM diagnosis. The last column specifies the condition of use of data in order to produce a global view of UGM functioning and for modelling.

Type of data collection :	**Countries**	**Concerns:**	**level**	**Useful For UGM**	**Condition for modelling**
Commodity flows (O/D)	Belgium, Sweden, Switzerland	Exchanges between regional areas	N	No	
Site/Land Use/Establishment surveys	Belgium, Germany, France, UK Netherlands	Movement generation	N SUS RS	Yes	Large stratified sample
Goods vehicle activity surveys (including driver diary surveys)	All countries (9), except Hungary, Netherlands	Vehicles use and traffic	N SUS	Yes	To know the link with the generator
Shipper surveys	France, Switzerland Belgium Germany, Spain Italy	All sending	N OUS SUS CD	Yes, if we find the consignee	Only for supply chain models (last mile?)
Receiver surveys	Be, Fr, Ge, It, Neth, Sp, UK Switzerland	All deliveries	SUS N	Yes	Road occupancy models
Good vehicle fleet licensing data	All, Except Hungary SPAIN	All vehicles	N SUS RS	Yes	For calibration
Traffic counts	Ge, Portugal, Sweden Be, Fr, Uk Hun, It, Neth, Sp, Sw,	All vehicles	N AUS SUS	Yes	For calibration
Distribution industry surveys	Ge, It, Neth, UK	Logistics chain	CD	No	
Vehicle operating cost surveys	Be, Fr, It, Ge, Neth, Switz Sp	Cost	N CD R	No	
Loading/unloading/parking infrastructure data for goods vehicles	Be, Hungary, Fr, Port, Sp, Neth	Way of deliver	OUS SUS AUS	yes	If linked to nearby activities
Data on road accidents involving goods vehicles	All, except Hu, Sp	Security	N OUS	No	
Data on lorry/lorry load thefts	Be, Fr, Neth, UK Ge, Switz	Security	N CD	No	
Employment surveys in freight transport and logistics industry	All, Except Hun, Sweden, Switz	Employement	N ?	No	
Land use databases for town/city needed for freight modeling	Fr, Ge, UK It Portugal	Location, Road occupancy	N OUS SUS	Yes	Zonal analysis
Port freight traffic data in the urban area	Neth, UK Be Fr, Ge,	Contribution of port to UGM	N OUS CD	Yes	If urban activity can be extracted
Rail freight traffic data in the urban area	UK Neth Ge	Modal Share of UGM	N OUS CD	Yes	If urban activity can be extracted
Inland waterway freight traffic data in the urban area	UK, Neth, Fr, Ge	Modal Share of UGM	N CD	Yes	If urban activity can be extracted
Airport freight traffic data in the urban area	Be, Fr, Ge, UK, Neth	Contribution of airport to UGM	CD NS	Yes	If urban activity can be extracted
Freight "NTIC" data (from cameras, sensors & other automatic data capture devices)	Neth, UK	Movements of vehicles, traffic	CD	Yes	For calibration

Key to Table 3:

? - uncertainty exists about whether freight data is collected,

NS = national survey/data collection, SUS = survey in some urban areas,

RS = regional survey/data collection, OUS = survey in one urban area,

AUS = survey in all urban areas,

CD = data collected by companies, trade associations or other commercial organization

Table 3. available UGM data and their utility

Conclusion

The table 3 shows available data collected in 11 different European countries and their degree of utility in models and urban planning.
Many of them are useful for local or ponctual diagnosis on UGM.
Some of them exist only in local or regional area
Several are useful for calibartion of models
Some of them can be useful for a global dignosis and modelling building, under conditions

Addressing gaps in urban freight data collection

A wide range of urban freight data gaps have been identified by the freight experts participating in BESTUFSII WP3 study (Browne & Allan 2006). The most commonly mentioned data gaps include:
Data about :

- light goods vehicle activity (generally vehicles below 3.5 tonnes gross vehicle weight)
- the supply chain as a whole
- freight and logistics infrastructure to and from which urban freight activity takes place
- loading and unloading operations and infrastructure for goods vehicles
- geographical data about goods vehicle trips in urban areas
- trips carried out by consumers for the purposes of shopping
- speed and route data for goods vehicles
- non-road modes

Surveys provide sometimes other data. Some of them can be directly useable for the urban goods transport analysis: traffic counts, Loading/unloading/parking infrastructure data for goods vehicles, port, rail, or inland waterway freight traffic inside the urban area, airport freight traffic data inside the urban area, land use databases for town/city needed for freight modelling, aerial photographs, freight informatics data (from cameras, sensors & other automatic data capture devices). Others data concern the transport sector, as : good vehicle fleet licensing data, data on road accidents involving goods vehicles, employment surveys in freight transport and logistics industry, vehicle safety and maintenance. This list is very large and corresponds to exact motivation. Few of these approaches are able to reveal links between activity's logistics and generation of UGM flows. The surveys able ble to do global diagnosis about urban logistics are costly

We presented arguments about a partial knowledge (essentially limited to French surveys and modelling. The reason is we did not find papers or reports which make a thorough description of relationship in data collection and models according to weighting of data and calibration of the equations of models. There are probably problems of confidentiality.