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The well-known impacts of freight distribution in urban areas are even more important and significant in small and medium size cities in terms of pollution, emissions and costs due to, among other factors, specific characteristics of the city structure (old road infrastructure, narrow streets, etc.), more strict access regulations, presence of heritage and historic assets (with higher risks for pedestrian safety). Moreover, it is also evident that the difficulties that local administrations face in addressing urban logistics are due, on the one hand, to the scepticism of local associations of shop owners (often operating in self supply provoking more difficulties than transport operators themselves) and freight operators (which are frequently small local operators) and, on the other hand, to the need of keeping the historic centres active (“Alive”) despite main urban policies in the last two decades tend to “void” it. With regard to this situation it is worth noting that a further difficulty, existing also in other mobility sectors (i.e. in the integrated management of parking services and other collective mobility services), is related to the lack of capability of planning integrated solutions (not only for the city logistics), of managing process evolution and insufficient structure and skills at the level of the single Municipality.

The ENCLOSE project, funded by the Intelligent Energy Europe programme, faced the different critical aspects mentioned above from the perspective of Local Authorities/Municipalities (including 9 European Cities), by “simply” (but not always known) recognizing that the small and medium size cities in Europe are more than 1350 (vs 21 cities with over 1 ml of inhabitants) and they need specific solutions and approaches that have not been addressed by the recent large European projects and EU Commission acts, which are, on the contrary, all focused on big urban realities. For this reason, ENCLOSE project acted on different levels with specific results related to:

- Implementation and operation of pilot Services in the three “forerunner” towns – Lucca (IT), Trondheim (NO) and ‘s- Hertogenbosch (NL) – where advanced logistics solutions already existed, and Soft measures, with the related impacts evaluation, in the 6 “follower” towns of Burgos (ES), Almada (PT), Dundee (UK), AlbaIulia (RO), Serres (GR), Balchik (BG);
- Knowledge and experience exchanges among the different ENCLOSE cities with the production of a portfolio collecting different training course materials, specifically addressed to the technicians of Local Authorities and stakeholders;
- Definition of Sustainable Urban Logistics Plans methodology and implementation and evaluation, in the 9 ENCLOSE towns, of the SULP integrated in the Sustainable Urban Mobility Plan (SUMP).

This paper provides a presentation of the ENCLOSE project, along with the key findings regarding the needs and potential logistics services for SMTs, discussed with respect to the successful experience of the measures adopted by the 9 ENCLOSE towns. Moreover the approach adopted by ENCLOSE for defining the SULP in each of the 9 cities is presented, along with the key feedback received by local policy makers, results achieved and limits encountered by the ENCLOSE towns in the implementation and adoption of the SULPs at local level - including technical and financial requirements, limits and policy issues – as discussed in Project’s deliverable “SULP Guidelines”.

...
Today, one of the main challenges faced in urban logistics is the distribution of goods. In Brazil, mid to large cities have suffered consequences of unplanned urban sprawl and lack of adequate transportation infrastructure. If in one hand a high percentage of the population live in urban areas (83.4% in Brazil), on the other hand the lack of an efficient planning, transportation policies and monitoring the use of urban space aggravates this scenario. As a fact, the growth of individual transport - in the last decade the use automobile increased by about 8% a year, and the motorcycle 15% per year, over the use of public transport which fell 30% in the same period (DENATRAN, 2015) - maximizes the traffic and the competition for parking spaces, which is vital for delivering goods efficiently downtown. According Portugal (2012), the city is an organism in constant transformation and, due to the changes in the urban environment, the impacts on transport activities are evident. Thus, the relationship between urban planning and transport stands out the attractiveness of some urban activities with direct impacts on the movement of people and goods and other component elements of urban space. The segment of bars and restaurants falls within this context. This is a vital activity responsible for significant percentage jobs and revenue. Foods & drinks move daily significant volumes of goods, to meet the need of customers. This paper presents the results of a freight trip generation model for pubs and restaurants in Belo Horizonte (Brazil). After obtaining the model that determines the number of trips generated per day, the results were extrapolated to Belo Horizonte and analyzed through interpolation, with housing data, income and employment. Belo Horizonte is a planned city founded in December 12, 1897 to be the political and administrative capital of the state of Minas Gerais. Despite the city still presents streets, avenues and land planned in the downtown, since its foundation until today very little has been re-designed with respect the transportation needs. The city grew mostly towards the limits and not much investment or major changes in the road infrastructure happened in the central area. As result, a massive volume of vehicles move daily towards downtown, which infrastructure and transportation policies must be remodeled to accommodate the movement of people and goods in an efficient manner. The study was conducted for the central region of Belo Horizonte, due to the fact the sector of pubs and restaurants are a major freight destinations (Oliveira, 2014). In addition, in the metropolitan area and Belo Horizonte there are about 12,000 establishments related to pubs and restaurants. The information about the establishments was obtained through the Municipal Taxpayers (CMC) provided by the Municipality of Belo Horizonte. In the CMC records we identified 4,360 establishments such as pubs, restaurants or similar in Belo Horizonte. The data for the freight trip generation model were obtained by survey. For this, we designed a structured questionnaire to obtain information about goods, frequency, operational time, place of performance of the loading/unloading of goods, establishment size and the number of employees. Besides this information, we investigated the acceptance of alternative practices in the delivery of goods, like off-peak delivery. To obtain the proposed models, we applied a simple linear regression, correlating the following variables: (i) Number of trips versus area of the establishment; (ii) Number of trips versus number of employees; (iii) Number of trips versus operation day of the establishment. With the results of the linear regression for travel generations, conducted the data interpolation based on the standard deviation of the results to define the sample classification bands. This interpolation method was chosen because it is one of the most suitable for analysis of spatially scattered points, given the straightforwardness of the model and does not consider extra noise such as slope and spatial constraints as barriers. In this method, interpolation is determined by the value assigned to each point (in this case the number of trips), wherein a point closer to the other higher correlation trend. Finally, the results were analyzed with the socio-economic data of the city of Belo Horizonte.
One of the main objectives of the current European Transport policy is to shift significant amounts of cargo from road to intermodal transport alternatives (mainly rail and short-sea shipping). Although the benefits of rebalancing the modal split have been extensively studied, less attention has been given to the effects that the desired transformation in intra-European modal patterns may have on urban transport. Ports and rail terminals are mainly located in urban areas. Therefore, a substantial increase in the volume of traffic channeled through these nodes will further aggravate urban traffic congestion problems and increase urban transport environmental and social spillovers. In this research we estimate the modal shift that could be achieved under different transport scenarios and its impact in the volume of traffic supported in urban area. In order to do so we use data obtained from a discrete choice experiment where decision makers were faced to the choice between road (the current mode) and an intermodal alternative which simulates the transport service by rail or a motorway of the sea service in the corridor linking the regions of Madrid with the Netherland / Belgium / Northern France / West Germany. Spanish cities that will be affected by the new patterns of transport considered in our case study are Madrid and Bilbao that in 2014 took the first and third position of the ranking of Spanish cities with higher levels of congestion. From a methodological point of view, we analyze the existence of discrepancies between the measures of WTP and WTA for the most relevant attributes that define modal choice in freight transport. According to the reference-dependence theory by Tversky and Kahneman (1991) choices made by individuals depend on the reference level or status quo and, losses or disadvantages have a greater impact on preferences than gains or advantages. This fact highlights the importance of testing for the existence of asymmetries in the preference formation when individuals face to the choice among different alternatives as well as to obtaining appropriate measurements of the willingness to pay (WTP) or its counterpart willingness to accept (WTA), which in turn represent a key element in the evaluation of transport policies. The specification of an asymmetric utility function with respect to the reference values provided by the current level of service perceived by freight forwarders allowed us to test for the existence of substantial asymmetries in perception of the transport cost in the specific transport corridor under analysis. Hence, the re-parametrization and estimation of our models in the WTP/WTA space helped us to quantify the discrepancies between the WTP and WTA for the attributes included in the choice experiment, namely transit time, service frequency and delay in delivery time. The analysis is based on the specification of an asymmetric utility function capable to account for the effect of increases and reductions in the level of service. A similar specification has been previously applied in the field of freight transport by Kurri et al. (2000), Hess et al. (2008) and Masiero and Hensher (2010). Accordingly, the expression of the systematic utility takes the following form,

\[ V_i = \sum_k \theta_{x_k}^+ x_{ik}^+ + \theta_{x_k}^- x_{ik}^- \]

being \( \theta_{x_k}^+ \) the marginal effect on \( V_i \) of an increase in \( x_{ik} \) with respect to the reference value \( x_k \) for the attribute \( k \); \( \theta_{x_k}^- \) the marginal effect in \( V_i \) of a reduction in \( x_{ik} \) with respect to \( x_k \); and \( x_{ik}^+ = \max(x_{ik} - x_k, 0) \) and \( x_{ik}^- = \max(x_k - x_{ik}, 0) \).
Lessons from previous experiences to implement sustainable solutions for city distribution show that the involvement of stakeholders in projects is critical (Melo & Costa, 2011; Lindholm and Browne, 2013). A stakeholder is according to Freeman (1984) an individual or group of individuals who can influence the objectives of an organisation or can be influenced by these objectives themselves. Stakeholders are thus not only those who are affecting a problem, but also the ones who are being affected by it (Macharis, 2005). Within the urban freight context these are usually the receivers, shippers, authorities, citizens and transport operators. These stakeholders might have conflicting objectives. Whereas authorities are responsible for governing urban areas, the private sector is responsible for the majority of the movement of goods. Measures often fail because not all stakeholders are involved early in the decision process. In addition, there is a lack of systematic assessment of the effects of different measures (Macharis et al., 2014). The support of each stakeholder group is essential to drive the sector towards economic, social and environmental sustainability (Behrends et al., 2008). The bottom-up approach, comprehensively involving different stakeholders, should therefore be a common practice. The success of freight quality partnerships is showing a positive trend in this regard (Lindholm & Browne, 2013). They allow to bring together the different stakeholders and to introduce communication within a sector that is typically very competitive. In this context, the multi-actor multi-criteria analysis (MAMCA) offers a method to improve the discussion among stakeholders. Based on a detailed analysis of each stakeholder group, the MAMCA shows an evaluation of the different possible alternatives from the perspective of each stakeholder. It uses the stakeholders’ objectives as the criteria for the evaluation. Hence, it is possible to clearly identify the alternatives that receive the most support from the different actors as can be seen in Figure 1. Each line represents the overall scores for an alternative by each of the stakeholders. Alternatives that can count on the support of all stakeholder groups will become at the top of the graph. At the same time, the visualisation facilitates the understanding among stakeholders. The visualisation does not only stimulate discussions, it also helps decision-makers to understand the problem, their priorities and those of other involved stakeholders. Altogether, it shows which alternative has the highest possibility of consensus and consequently helps to enhance the acceptance of the final result (Macharis et al., 2012). In the example below it could be said that alternative 3 (S3) has the highest probability of consensus.

![Figure 1: The results of a MAMCA (Source: Macharis et al., 2014)](image-url)
Urban population is steadily growing, bringing along a manifold increment of demand for goods and services, mainly concentrated in relatively limited or overly constrained areas. This is inevitably leading cities around the world to face increasing challenges in terms of efficient transportation of goods, while controlling — and ideally reducing — its negative impacts (i.e., congestion, pollution, noises, accidents…) on the quality of life of their citizens, without penalizing the city’s many economic, social, administrative, cultural, touristic, and other activities (Benjelloun et al., 2010). In this respect, many cities around the world are undertaking city logistics projects (CLP) to address the above mentioned context, with the aim at optimizing the logistics and transport activities by public and private actors in urban areas while considering the traffic environment, the traffic congestion, and energy consumption within the framework of a market economy (Anand et al., 2012). Just to name a few, the experience provided by the Padova City porto project1, the project Annona in Saint-Etienne2, and the LAMiLO project in Luxembourg3 are good representatives of the efforts devoted on the topic. In this paper, we illustrate and discuss the main results of a CLP carried out in Bergamo, a mid-size city in the north of Italy, close to the Alps and to a major city like Milan. As part of a larger project about smart cities called Bergamo2 (035) A New Urban Concept in a changing World led by the University of Bergamo, the Bergamo Logistica project aimed to design and develop activities to identify and analyze i) the main issues, ii) the local ongoing projects and initiatives, and iii) the ideal directions of development in a small-medium city. Therefore, in the paper we discuss the main evidences and findings gathered so far through several investigation activities, including literature analysis, workshops and interviews with the main stakeholders. In doing this, we mainly highlight the main issues to address and the main barriers against the development of a city logistics project. Furthermore, as a CLP inherently involves many logistics-related decisions along several dimensions (from the definition of the best place for locating logistics activities such as urban distribution centers, to the last-mile delivery planning and execution, from the organization of limited traffic zones to the deployment of environmentally sustainable fleets of vehicles), we illustrate the Bergamo case study with a particular emphasis on the role of the stakeholders, their involvement in the project, and the resulting initiatives that emerged from a co-creation process involving public authorities and private stakeholders, associations at different levels, research centers and common citizens, among the others (Stathopoulos et al., 2012). At the beginning of the Bergamo Logistica project we identified a number of possible solutions to improve urban freight within the city boundaries and through the city center of a typical mid-size European city, of which Bergamo can be an example for its characteristics (e.g., population, position with respect to other cities) and for the constraints it is subject to (e.g., conformation of historical center, local regulations). As a starting point, we identified some general trends related to the transportation of goods in Bergamo, such as the slow but steady increase of the population in urban areas, the fragmentation of demand both geographically and over time, the diffusion of e-commerce with the related last-mile delivery issues, the relatively high number of small and medium-sized shops in the city center, the request for more flexible and timely delivery lead time, the increase in the frequency of delivery (especially requested by small-shop owner that do not want to keep large inventory stocks), and the increasing number of actors (stakeholders) in the sector. The identification of these trends was based on several sources (ISTAT, Transport White Paper, European Commission documents, extant literature, observations). Subsequently, we revised the main and more recent city logistics solutions proposed both by different Italian actors (in particular, Lombardy Region) and from the literature. According to the Lombardy Region guidelines, we grouped the solutions into four main areas: Access restrictions, Infrastructures, Technology, and Regulations (Table 1). Within these areas, we have identified several unique solution proposals based on what already exists in Europe and in Italy, and based on solutions that have a different level of complexity and may therefore be implemented gradually.
This paper is a part of a larger research project “Business models for city logistics”. Purpose of this paper is to identify patterns in and categorise city logistics business models. In the overall research project we have identified a number of economically as well as technical, environmental and operational feasible business models and even if the models have several similarities they also show patterns that differ widely. In this paper we strive to identify the patterns that differentiate the models from each other and suggest a categorisation framework that can be used to illustrate different types of city logistics and its business models. This framework can provide a contribution to both practitioners and researchers within city logistics as it can support the understanding of different types of city logistics. These “models types” that can be used as guidance when designing a business model for a specific city logistics solution and to manage these solutions. The overall research project, in which this study is a part, is developed within the frames of "Roadmap City Logistics – A National Roadmap for Urban Transports in Sweden". During the work with the roadmap all actors considered the absence of business models for city logistics to be a barrier for more environmental friendly urban goods transports. The aim of that overall project is to develop models supporting design and decisions on city logistics and business models describing division of roles between actors and financial prerequisites for cities, logistics service providers, retailers etc. The project is focused on small and mid-size cities with about 25 000 – 300 000 citizens. The project will contribute with practical models for cooperation between the different partners in a city logistics system, including; Business models for different city logistics systems both public and private/commercial. Decision models for the different actors, Allocation models for costs investments and revenues between the actors, Business conditions for the different actors – cities, logistics providers, retailers, real estate companies, etc. As such the overall research project and the specific research in this paper contribute to stimulating sustainable city logistics initiatives, stakeholders’ behavioural change and engagement. Many city logistics initiatives of today are technical driven – not business driven, focusing on technical, environmental and operational feasibility, e.g. emission free vehicles. However, a consideration to the economic feasibility is often week or totally lacking (Quak, 2011). Long term success of city logistics solutions requires a viable business model that secures financial feasibility (Quak et al., 2014). To define city logistics business model is also considered an important foundation for the involved stakeholders (Macário et al., 2008). The lack of consideration to business models is identified as a major barrier to implement city logistics (Lindholm et al., 2014). Business models can be implemented in a different scope, engaging all sub systems in the urban logistics system (Macário et al., 2008). All cities are different and the city logistics initiatives implemented must consider the specific character of the city, resulting in different solutions. As the important research of characterising different types of cities and initiatives, there is a need for identifying different types of business models for city logistics initiatives. The knowledge today is limited regarding how the unique city context and type of initiative influence e.g. the content and priorities in a feasible business model. Another differentiator is the initiator of the city logistics system. Allen and Browne (2010) put forward two actors that can implement city logistics initiatives: the logistics/transport companies and authorities. Munuzuri et al. (2005) add the goods owner (sender or receiver) as a third potential actor. In our cases we have seen significant differences between systems initiated by authorities, and logistics companies. This raises the questions if the business models differ depending on the initiator? And, can different business models be characterised based on the initiator? Environmental and social aspects are often put forward as reasons for implementing city logistics initiatives (see e.g. Lindholm et al., 2014; Björklund and Gustafsson, 2015; Culliane and Edwards, 2010; Patier and Browne, 2010). However, the knowledge regarding to what extent and how social and environmental components (for instance external costs) are considered in existing business models is very limited. What characterises the business models that consider these aspects and can this is described as a “business model type”? ...
The adoption of electric mobility (e-mobility) is important to achieve the objectives as set in the “Roadmap to a single European transport area” (EC, 2011). In addition to the exclusion of ‘conventionally fuelled’ cars by 2050, the roadmap sets a specific ambition for city logistics, which should be essentially CO2-free in major urban centres by 2030. Next to European CO2 targets, cities adopt e-mobility as measure to reduce local air pollution. While vans and trucks represent approximately 10% in total national fleets (BOVAG, 2014), they are responsible for about 70% of the road transport related NOx concentrations in cities (TNO, 2015). Cleaning logistics fleets is crucial to achieve the GHG emission reduction targets for transport and to improve the sustainability of cities. Despite many incentive programs and improvements in the technology of electric freight vehicles (EFV), large scale implementation of EFV does not come off. The market share of electric vehicles among vans and trucks in the Netherlands is only 0.08% (BOVAG-RAI, 2014) and its growth in the last years is unpromising as compared to personal electric cars. So why does the logistics sector does not adopt this - highly needed - technology? An increasing number of projects such as ENCLOSE, FREVUE and NSR E-Mobility focus on the uptake of freight electric vehicles in urban areas. The projects explore current challenges, demonstrate the viability of EFV in pilot studies and disseminate knowledge. The preconditions for large-scale uptake of EFV that are mentioned in these projects are related to:

- Presence and affordability of vehicles and charging infrastructure;
- Suitability of logistics operations;
- Policy scheme of public authorities.

Behavioural aspects seems to be left out of scope in these projects. ENCLOSE (2014) addresses ‘user acceptance’, but only as an issue within the early implementation phase, that is, among test drivers. FREVUE (2013) mentions the potential positive influence of EFV on the company’s image, which may imply a positive behavioural attitude towards EFV from an entrepreneurial perspective. Yet proof of this influence is lacking and more importantly, it is not known whether non-EFV companies commonly share or, are aware of this vision. Let alone, whether it motivates them to adopt e-mobility for their logistics operations. Research on the preconditions for EFV uptake from a non-user’s behavioural perspective, is lacking. Simultaneously, policy makers introduce financial incentives, supportive measures and pilot projects, while not being aware of the behavioural status of the target group. The objective of this paper is to provide lessons for appropriate instruments, for each phase of behavioural change, to increase the effectiveness of government spending on the uptake of EFV. This paper is built upon a behavioural change model, developed by Marcel Balm (2000). The model of Balm was initially developed for physiotherapists, but is applicable for various types of change, as shown in this paper, where the model is applied to the adoption of electric vehicles in the logistics sector. The model describes 6 steps that people go through in the process of behavioural change: perceptiveness, understanding, wanting to, being able to, doing and persevering. The steps can be categorised in three phases: pre-adoption, preliminary adoption and long term adoption. While Balm (2000) argues that receptiveness is a prerequisite for the pre-adoption phase (i.e. understanding, wanting and being able), we argue that receptiveness is very much integrated in phase 1. Being open for change does not occur in itself, but is fostered by awareness, willingness and ability. We therefore do not consider receptiveness as separate step in the model. Below, the 5 steps that we distinguish are described. For our final paper, we further discuss and enhance our model with the Innovation Theory of Rogers (Rogers, 2003) and the AIDA-model (Strong, 1925).
The European Commission is expecting European countries to reduce their annual greenhouse gas emissions by at least 20% by 2020 and by 60 to 80% by 2050, compared to 1990 emissions level. With commercial transport and logistics currently contributing to an estimated 20 to 25% of overall global CO₂ emissions, evaluating the efficiency of current distribution structures and investigating into alternative energy sources for transport is important. The need to reduce emissions, CO₂(e) as well as noise emissions, is particularly important in cities and urban areas, where population is dense and a lot of traffic is related to commercial transport and distribution services; e.g. in Berlin, Germany, about a third of the urban traffic is commercially motivated traffic. The interest in considering electromobility as an alternative for conventional urban commercial transport is further accelerated by the fact, that many distribution vehicles are equipped with diesel engines, which are often not state-of-the-art regarding minimisation of emissions, and therefore these vehicles further contribute particles to the emission-problem in addition to fumes and noise. Electric vehicles for urban logistics therefore are an alternative worth considering when aiming for reduction of local emissions. Despite research, fundings and projects run jointly by OEMs, ministries and research, the number of electric vehicles currently used for urban logistics is still very limited though. It is the aim of this research to map out the user needs of urban logistics providers in regards to vehicles and routings, based on empirical research done, using the example of Berlin and to contribute to the discussion, how and in which urban logistics segments a swift move to electric vehicles might be realised and desirable. The research reflects identified needs, concerns and discrepancies between perceived needs and concerns and actually measurable needs and concerns. Based on this analysis, obstacles of a move to electric vehicles are shown. Furthermore, considering financial structures of investments in vehicles and fleets in combination with the identified needs, the research suggests areas where a move to electric vehicles could be achievable. In 2014 an extended empirical research in form of an online survey was carried out in Berlin in order to gain in-depth insight into the structures of commercial transport, its tours and shift structure and the participants expectations towards the usability of electric vehicle for their operations: over 340 businesses in the urban area of Berlin where contacted to identify the best point of contact for the survey. Over 120 contacts were identified and agreed to participating into the survey. By the means of a questionnaire of 56 questions participants in the survey were asked to specify their fleet structure, ownership of vehicles, touring development behaviour, touring patterns, including e.g. average route, longest route, average number and length of stops etc., shift patterns, user expectation towards electric vehicles. Around 33 of the approached contacts answered to the questionnaire: The companies of the sample are mostly smaller companies with less than 200 employees, 2 million annual turnover and their fleets comprises 1 to 5 vehicles. In most cases vehicles are out of service for at least eight hours per day. Thus, charging them is possible without problems, even if no fast charge option is available. An analysis of the tour patterns reflects, that there is no pattern regarding tour length, parking time, shifts etc. which can be related to a particular industrial sector: As a consequence, there is no evident direct link between industrial sector and suitability for electromobility. Instead, the dominating purpose of routings gives an indication on whether electric vehicles can be used within the fleet of an organisation or not. A further analysis of the answers of the survey gave insight into the behaviour of commercial transport participants and in their motivation. The findings therefore contribute to understand the motives and decision parameters that need to be addressed for achieving a shift to electric vehicles for urban commercial transport and logistics. In particular financial concerns were raised during the online survey.
In transport model systems that are used in practice for forecasting and project appraisal, time period choice is usually missing. However, there is evidence, especially in passenger transport, that departure time choice is rather sensitive to changes in transport time and costs. Transport models that do include a time-period choice are usually passenger models. This is probably due to the fact that for this segment more time period choice data is available. Very little is known about the sensitivity of the time period choice to time and cost changes in freight transport. Freight transport models with time-of-day choice modules are almost non-existent. This paper describes the development of a new time-period choice model for freight transport based on Stated Preference (SP) data, that was collected in Flanders as part of a project to improve the current Strategic Flemish Freight Model (SVV) of the Flemish Traffic Centre. The current SVV does not contain an explicit time-period choice model. For the new version a module has been developed that can determine how many road freight vehicles will depart earlier/later in response to increasing transport times (i.e. congestion) and/or increasing transport costs (e.g. road user charging that is differentiated by time-of-day). In the SP interviews we focussed on the receivers of goods (consignees). Industry experts and the (limited) scientific literature tell us that they usually determine the delivery windows of the goods, and that carriers are bound by the choices that the receivers make. The SVV works at the aggregate level and the implemented time-period choice model can only handle a limited amount of information on the variation in behaviour between different receivers of the goods. In this paper we will report models that have been estimated subsequently on the same SP data, that allow for more heterogeneity among the respondents, both observed and unobserved heterogeneity. It is very hard to obtain revealed preference (RP) data on transport time and cost by time period of the day; these variables are difficult to measure directly, and transport time and transport cost are highly correlated. Furthermore, the transport costs vary only little over time periods since there are few areas that have road user charges that vary with time-of-day period. Therefore, we have based the time-period choice model on stated preference (SP) data. Firms in Flanders receiving goods by road transport were selected from company registers and called by phone to check whether they are in scope and to ask them to participate in the SP survey. The stated preference interview itself was done by computer assisted personal interviewing (CAPI). About 25 pilot interviews were carried out, followed by a main survey of 150 firms. These were stratified by type of firm (manufacturers, wholesalers/warehouses and retailers) and by transport distance class for the typical transport that serves as the context and reference situation for the SP experiment. Since we are interested in shifts away from the peak, if sufficed to sample shipments that are currently transported in the (morning or evening) peak. So in the interview we asked the respondents to describe a recent road-based shipment that was transported (at least partly) during a peak period and in the SP experiments they were asked to choose between two (hypothetical) alternative transports for this shipment. Each transport is described by the following characteristics:

- Transport time
- Transport cost
- The start and end of the delivery time window: this is the timeframe within the receiver wants the shipment to arrive at its final destination.

In the statistical design the presented attribute values are derived from four attributes: transport time, transport cost, width of the delivery time window and midpoint of the delivery time window. The SP data have been used to estimate discrete choice models that explain the trade-offs between transport time, cost and earlier/later transports. First, multinomial logit (MNL) models were tried, with different specifications for time and cost (e.g. linear, logarithmic, Box-Cox), but without differentiating on the basis of characteristics of the receivers.
An increased concentration of population in urban centers generates a growing demand for goods. Urban freight operations, supporting this growing demand, are commonly associated with negative externalities (i.e., noise, pollution, poor parking practices) which can be originated by lack of capacity and infrastructure inefficiencies. For example, double parking can be a result of scarce or poorly located dedicated freight parking (1) (i.e., loading/unloading – l/u – bays, where freight vehicles can park without disturbing cars or pedestrian traffic), or from the undue occupation of l/u bays by non-freight vehicles (1, 2, 3). Poorly dimensioned l/u bays (3) can lead to inefficiencies in the delivery process, causing delays. The very structure of the road network can be a contributor to increased freight movements within a defined area, due to lane structure or street directionality (4). The assessment of the existing freight parking problems at a city-wide level, or even in a defined zone, can be a time consuming endeavor, implying extended observation periods. This paper adds to the existing body of research by exploring the relations between perceived urban freight delivery issues and commercial establishments’ characteristics, associated distribution channels, delivery operation patterns, location of establishments and land use patterns using a Structural Equations Modeling (SEM) framework. The main motivation is to test the hypothesized relations between the stated elements as a way to perform an indirect, but informative, freight infrastructure assessment. The hypothesized model structure allows exploring, for example, if the distribution channel characteristics’ (e.g., most frequent vehicle type) could be associated with a certain type of parking behavior/preference due to operation requirements, which could result in perceived freight parking issues. The analysis included several variables. Explored establishment characteristics are, for example, size in number of employees and weekly deliveries. Distribution channels are characterized by the predominant delivery agent and vehicle type. Delivery operations are represented by the most common parking location. The perceived issues include, among other issues, blocked vehicles, lack of l/u bays or illegal parking within l/u bays. The land use patterns were first modeled for each establishment by using a factor analysis technique as a data reduction and multicollinearity elimination technique. The factors characterize a) zones with mixed land use characterized by high commercial variety and density and high residential density, b) zones with a smaller density of establishments by street length c) zones with a higher density of l/u bays surrounding each establishment. The factors captured 84% of the total variance of these land use variables. The chosen variables were selected from a plethora of sources and merged into a single coherent dataset.

- An Establishment-based Freight Survey with geo-referenced establishments, detailed in (5).
- The Commercial Establishment Census, performed by the City Council, where a detailed geographical record of the existing establishments’ location and industry category is available.
- The road network for the city of Lisbon from OpenStreetMap (6) including details about road type and segment length.
- The 2011 National Census records, made by the National Statistics Institute (INE) (7).
- Mobility/Parking agency records of the locations of l/u bays.

The SEM model was developed aiming to confirm several hypothesis relating the influence/interaction between perceived urban freight delivery issues and commercial establishments’ characteristics, associated distribution channels, delivery operation patterns and land use patterns.
The transport of materials and personnel to urban construction sites, take a large share of the total number of trucks (20%) and vans (40%) in cities (HVA Research, 2009 and 2014). This has negative consequences for residents, visitors and businesses in the neighborhood where construction works take place. Smarter and cleaner city logistics solutions are needed. The ‘ground rules’ for smarter and cleaner construction logistics in urban areas are set during the tendering process. This research developed a framework for ‘logistics quality’ to be used as a quality criterion for EMAT (Economically Most Advantageous Tender) procedures to support tendering construction projects by both public and private clients. On the basis of recent research, patterns of development of alternative logistic systems and relations between the participants of construction projects have been evaluated. Evaluation of recent urban construction projects introducing innovative logistics concepts by construction companies shows that implementing alternative urban logistics concepts can significantly reduce total logistic costs, urban congestion and improve productivity. The University of Amsterdam and the Amsterdam University of Applied Sciences are building three new campuses in the centre of Amsterdam. The construction and renovation works provide much additional urban freight flows and air pollution at busy traffic junctions in the city. In recent years, there is great pressure on sustainable processes in the construction sector (e.g. BREAAM) due to more construction projects in cities and the need to pay more attention to quality of life, accessibility, safety and communication with stakeholders. Until recent years the complexity of the construction supply chain and lack of data alignment herein were major obstacles for improving urban freight flows to construction sites. Modern information technology in the construction supply chain, such as the Building Information Model (BIM), now offers possibilities to share logistics information in the supply chain in order to reduce the number of transport movements of equipment and personnel to and from the construction site and using other modes of transportation (e.g. waterways) and at the same time reducing the cost of failure. The transport of materials and personnel to the construction sites, take a large share of the total number of trucks (20%) and vans (40%) in the cities. This has negative consequences for residents, visitors and businesses in the neighborhood where constructions works take place. This research developed a framework for ‘logistics quality’ to be used as a quality criterion for EMAT (Economically Most Advantageous Tender) procedures to support sustainable tendering by both public and private clients. This framework has been developed based on ‘lean and green’ criteria (Ploos van Amstel e.a., 2013) used for e.g. outsourcing in the logistics industry (using an ‘integrated logistics concept’), the evaluation of construction logistics for current building projects from the University of Amsterdam and the Amsterdam University of Applied Sciences and expert interviews. Evaluation of ‘best practice’ construction projects (Merrienboer, 2013) shows that construction logistics can be optimized through cooperation in the construction supply chain (between contractors, suppliers and logistics service providers), the use of alternative freight solutions (such as bundling, water transport, urban consolidation centers, combining inbound and outbound flows, traffic control measures and personnel transport), the use of modern information technology for the planning and control of the material flows, decision support models, gain sharing and collaborative behavior between parties in the construction supply chain during preparation and execution of the project. Also proactive communication with stakeholders (residents, local government, businesses) supports realising benefits. Accordingly, the framework for EMAT evaluation covers: logistics strategy, urban freight network and evaluating alternatives, tactical and operational planning and control, construction logistics information and communication technology, logistics organisation and key performance indicators.
The study of behavioural responses to urban freight policies and innovations requires a recognition of the fact that multiple stakeholders in a city (including consumers, retailers, shippers, carriers and municipalities) determine the effects together, often in close interaction. These stakeholders have different goals, constraints and modes of interaction; which makes the city resemble a distributed decision making system (Anand et al., 2014). In this system, parties are asymmetrically informed, are seeking for cooperation, and are behaving opportunistically to their own autonomous goals (Schneeweiss, 2003). From the economic point of view, a new policy or initiative often involves extra cost to the stakeholders. Improper distribution of the extra cost could lead to unsatisfied stakeholders (those who are negatively affected by such policy) and eventually to failure of such initiatives. For instance, most UCC operations started with a huge subsidy from the government could not last long due to the high cost incurred to UCC. In another study, done in New York City, Holguín-Veras (2008) explains that the balanced cost distribution between the carrier and the shopkeeper is a necessary condition for the success of off-hour delivery by the carrier. Such situations point to the fact that the economic aspect of cost distribution also requires analysis from the viewpoint of multiple stakeholders. Their reactions to the extra cost give an indication as to whether such a concept has potential for solving city logistic related problems. In this paper a new policy concept is introduced and tested: carbon credit points for urban delivery. The concept of delivery and price setting is inspired from the carbon credit system of the Kyoto protocol (United Nations, 2006). In the Kyoto protocol, the effect of carbon is considered at the global scale and as per the treaty each country that is part of this protocol is responsible for reducing carbon levels. The Kyoto Protocol introduced a medium called carbon credit to achieve the goal of CO$_2$- reduction. Each county receives a certain carbon credit and each carbon credit permits emissions of one ton of CO$_2$. If a country has emissions of CO$_2$ that is over its allowance, it incurs extra cost. Conversely, if a country is able to stay under its allowance, it can trade its credit with another country. In city logistics, the delivery cap and price setting focuses on the direct objective to reduce the number of truck-km travelled by conventional vehicles (e.g. diesel and gas powered trucks), to achieve the higher goal of emission reduction. Distance travelled by these trucks is directly associated with issues such as congestion, pollution and safety related issues in the urban areas. Distance travelled depends on the use of UCC’s and type of truck, while demand is driven by consumers as well as order frequency and lot sizing behaviour of shops. The scenario takes the number of goods deliveries at shops as main point of intervention for the CCP policy. The following research question is formulated: ‘Can the implementation of a carbon credit point concept create value for all stakeholders involved?’ To answer this question first a literature review is carried out to reveal the details of carbon market based mechanisms based on Kyoto Protocol and earlier executed researches concerning application of these mechanisms. The next step is the development of a participatory simulation game to introduce some variants of carbon credit point concepts. Some of the results will be presented in this paper. Earlier researches indicate three different types of carbon market based mechanisms: (– International Emission Trading (IET), Clean Development Mechanisms (CDM) and Joint Implementation (JI) –). These not only reduce the amount of emitted emissions but also encourage participants to achieve their target in a cost-effective way. Earlier researches have applied Kyoto Protocol’s mechanisms in various areas including supply chains, electronics, power plants and so on. In particular, the application of transport and logistics is mostly found in researches dealing with the emission trading mechanism. This result is strong in contrast with the other mechanisms, CDM and JI. The carbon credit point concept can be seen as an implementation of IET at city level.
ID 17: An assessment framework for city logistics in mid-sized towns

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City Logistics is still on top of European and local municipalities agendas. Despite the existence of consolidated solutions that can theoretically fit any city (Dablanc, 2007), still many city logistics projects fail because lack of stakeholder involvement or systemic change. Because of this, several researchers provide in-depth case studies performed on single cities, thus providing a useful library of experiences (e.g., Álvarez, 2011; Hesse, 2007). Nevertheless, these case studies are difficult to be compared, as the time frame, data collection methods and context of the cities are often very different. As a consequence, in this paper we selected two European cities representatives of mid-sized towns that have initiated to redesign their urban logistics systems: Bergamo (north of Italy) and the city of Luxembourg. In the paper we provide a comparison of these two realities with the aim of defining an assessment framework to benchmark cities in terms of city logistics characteristics and readiness.

We selected Bergamo and Luxembourg for several reasons. First, both cities have undergone a process of stakeholder involvement on city logistics issues. Moreover, these two cities are located in different countries, so characterized by different regulations and operators, thus making the comparison more interesting. In the years 2013-2014 in both cities meetings with the stakeholders to discuss the main issues were organized. In both cities these classes of stakeholders have been involved: transportation companies, express couriers, municipality, Region (Bergamo) / State (Luxembourg), shop keepers. The two cities were also mapped using Smart City Logistics platform, a GIS system developed by LIST, using the same sources, data collection and mapping methods (described extensively in the full paper). For each city, about 30 layers of different information were collected. In this paper we present a comparison of the two cities according to a set of dimensions partially retrieved from the literature and partially developed ad hoc for this study. First of all, the literature always points out the importance of the stakeholders’ perspective on city logistics issues...
Public sector organisations, such as municipalities, universities, health institutions and the police act as promoters of safe, clean and sustainable cities. They set guidelines, conduct research and impose restrictions to achieve accessible, liveable and healthy cities. These activities have in general been directed towards other - private - organisations and citizens. For example:
- Municipalities provide purchase subsidy programs to the business sector for electric freight vehicles;
- Research groups at universities analyse and develop clean and efficient transport solutions;
- Hospitals encourage visitors to use cycling as a more environmentally friendly form of transport.

However, the ambition to lead by example is growing. And this is more than justified, when we look at the impact of public sector deliveries on city logistics (Balm, et al, 2015). The purchasing behaviour of the public sector may be key in the development of viable business cases for smart and clean urban distribution systems. Public organisations can act as game changer in smarter and cleaner urban distribution, considering their:

**Economic impact:** The World Trade Organisation estimated that public procurement represents around 10-15% of most economies (WTO, 2012). The municipality of Amsterdam spends EUR 1.5 billion a year on products and services (City of Amsterdam, 2014).

**Delivery volume:** Public buying represents 5 to 10 percent of urban freight volumes. The number of deliveries at two educational institutions in Amsterdam was estimated to be 90,000 per year (Balm, et al., 2014).

**Role model function:** Public organisations have many “customers” and many suppliers. In addition, they are visible to a wider public, in day-to-day life and in the media. Their behaviour can be leading for others. In various European Cities like Rotterdam, Amsterdam, Stockholm, London and Newcastle research groups have been working together with public organisations to 1) gain insight into the transport volume related to the delivery of products and services at these institutions and 2) to discuss the role of the public organisations as large receivers and promoters of sustainable transport. The next step is to change the behaviour of public purchasers such that it benefits clean and smart urban freight distribution. This step has already been taken in a trial in London, where public sector deliveries are consolidated at a consolidation centre for delivery to 300 council buildings (LAMILO, 2014). The full paper for URBE will focus on the behavioural challenges and opportunities that are faced when changing public sector deliveries over the long term. The paper is built upon a research and pilot study at the Amsterdam University of Applied Sciences and University of Amsterdam. Next, it discusses and compares similar studies in the Netherlands, Sweden and the UK to derive lessons for success. The University of Amsterdam (UvA) and Amsterdam University of Applied Sciences (AUAS) are two academic/educational institutions in Amsterdam, with about 30,000 and 50,000 students respectively. UvA employs 5,000 and AUAS 3,593 people, in educational, research and staff functions. The institutions work together for most of their central services, such as Facility Services. Facility Services is responsible for all the facilities in and around the campus buildings and aims to contribute to more efficient and sustainable transport to and from the buildings. They asked the AUAS Research Program Urban Technology to conduct research on the current situation and possibilities for improvement. This research took place in Oct-Dec 2014 and considered the deliveries of the previous year. An online survey was sent to suppliers, of which 278 fully completed the questionnaire. Based on the survey results and discussion with the project’s steering committee, three possible solutions were selected for a follow up in 2015. These solutions are currently further examined, and where possible, tested and implemented...
The purpose of this study is to identify the perception of retailers and carriers involved in urban distribution of goods in Belo Horizonte (Brazil), regarding the effectiveness of practices related to city logistics. In addition, we evaluate the disposition of retailers and carriers in taking part in city logistics schemes or pay to join. Within this context, it is important to identify solutions to improve and rationalize of urban freight distribution and consider the consequences and results for the stakeholders. The government acts as responsible for establishing rules for the movement of freight vehicles, usually without assessing the causes and consequences. With purpose of promoting the welfare of the population, the government usually consider social benefits, disregarding, for example, the increase in operating costs for carriers and retailers (QUAK, 2012). The solutions that reduce or mitigate the impacts caused by the negative externalities and urban goods distribution are searched extensively worldwide. In Brazil, most of the strategies adopted by public managers of the major cities in relation to urban freight distribution is restricting the movement of freight vehicles, often practiced by the lack of knowledge of other measures or tools to minimize these impacts (MACÁRIO et al., 2008). Also as emphasized Dablanc (2009), these restrictions are not always interesting or effective, increasing costs and externalities, contributing to a worsening of the service level of the distribution of goods and affecting entire distribution process for all involved. The adoption of more than one solution to urban goods distribution problems is eliminated or decreased is extremely important (TANIGUCHI et al., 2001). The study of these solutions and their consequences for all involved should be considered to reduce the impacts from the urban freight transport through effective solutions in order to improve urban mobility and consequently the quality of life. In this research, we used survey to collect data about two stakeholders in the urban goods distribution: the retailers and carriers. For carriers, the survey includes collecting information on vehicle characteristics, the logistic operator and operation, with questions such as manufacture year and vehicle length, operator category (company or autonomous), number of deliveries in the central area of Belo Horizonte, route used and average travel time. Considering best practice, the issues consider about the perception of the efficiency of the measures and, if operators were willing to pay for participation in some solutions like UDC, truck lanes, technologies such as loading/unloading booking system and real-time traffic information system and off-peak delivery. For retailers, the survey collects data about the delivery such as amount and times of deliveries, weight and dimensions of the products received and urban goods delivery problems. Similarly to the carriers, the questionnaire has questions about the perception of retailers about good practice and the willingness to pay for services such as booking system to loading and unloading spaces. In addition, the questionnaire investigates the acceptability in relation to subsidies such as tax exemption and cooperative system for off-peak delivery. To evaluate the perception of the good practices of urban freight distribution, we used the Likert scale, with the options of (i) totally agree, (ii) partially agree, (iii) neither agree nor disagree, (iv) disagree partially and (v) strongly disagree. The perception of good practice efficiency was carried out using the classification (i) very efficient, (ii) efficient (iii) efficiently or inefficiently, (iv) inefficient and (v) very inefficient. We interviewed 283 carriers in Belo Horizonte Central Area, between June-August 2014. The results indicate that carriers for the truck lanes help improve the distribution urban (3.73), but the increase in the number of traffic lanes has a better efficiency (3.78) than truck lanes. The consolidation of goods in UDC (3.34) and the payment for the use of loading/unloading spaces (3.17) may not be as efficient. Despite the fact that loading/unloading spaces be a problem for 92% of carriers, a booking system received a positive evaluation (3.58), but that can be considered low. The off-peak delivery is not well evaluated by respondents (2.94) and electric or GNC freight vehicle is good (3.70).
The aim of this paper is to present funding opportunities for investments with private capital participation for urban mobility infrastructure, through project finance. This model searches to bring economic fundamentals of engineering, making it possible for the participation of private sector in the financing of projects of the Urban Mobility Plans of Brazilian cities. According to Oliveira Filho (2013), the Brazilian experience refers to a strong dependence on public funding, that even demonstrating great strides in financial structures in the past, nowadays is proven to be insufficient to fill the demand of infrastructure investments, among other related to urban mobility. “For the development of public-private partnerships is required the design of a more stable resource base, either for the long-term funding bill itself, as for the guarantees of the project, or in venture capital funding.” (Oliveira Filho, 2013, p. 364) However, more than a urban infrastructure financing model that meets the mobility, it is important to achieve synergy with models to review the metropolis land use in favor of pedestrian, to create conditions of low carbon vehicles and options to improve urban mobility as a whole. From this perspective, the problem that guides this research is how to build a model for infrastructure urban mobility investment with private capital participation, in order to achieve the funding amounts needed for the urban mobility in Brazil. An alternative for cities emerges from Brazilian Law n.12,431/2011 and National Decree n. 7,603/2011, which generated attractiveness to private finance of infrastructure projects and can create a new opportunity for private sector participation in the financing of urban mobility projects. In the search of funding needed to provide investments in urban mobility, whether in the public transport construction or in its operation, it is possible to list forms of financing as pointed by Olsen and Fearnley (2014) and Olsen et al (2011): 1) Subsidies; 2) Loans; 3) Taxes intended; 4) Gain on property values; 5) Private operation (concessions), and; 6) Public Private Partnerships (PPPs). These alternatives are practiced while ordinary budget resources are insufficient. It is also possible that these alternatives are associated, depending on the model set by the government authorities. Oliveira Filho (2013) and Wajnberg (2014) pointed out that, with the enactment of the Law 12,431 (Brazil, 2011), appeared new incentives for investment in private fixed income, leading to zero the incidence of income tax for debentures and investment funds. Investment funds in receivables (FIDC) emerged in Brazil by the Resolution 2,907 / 2011 of the Central Bank of Brazil. "These funds are based on the securitization of credits arising from loans, financing (including real estate), leasing operations, among others" (Silva, 2006 p.45). As Luxo (2010), these funds can be strategic in financial management meeting the following demands: 1) Source of funds to issue the capital needs; 2) Leverage new resources; 3) New alternative to change the debt profile; 4) Possibility of greater operational efficiency. The Real Estate Receivables Certificates (CRIs) were created by the Law n.9,514 (Brazil, 1997), as a debenture, like a source of dedicated funding for the housing market, following the same logic of financial leverage credit to future receivables. These two mechanisms of financial leverage, FIDCs and CRIs, are also benefited by the law 12.431/11, and can be a new strand of funding for urban mobility projects, facilitating the sponsors diversification, generating financial strength in the Urban Mobility projects and speeding these funds. This model, using Finance Project, as a private capital financing in infrastructure projects for urban mobility is justified by the need to review the terms of the government participation in public investment, and the behavior of Public Private Partnerships in Brazil, specifically for investment in urban mobility. Roads, pipelines, power generation and electric energy transmission, among other infrastructure projects, were successful when using Project Finance as infrastructure financing method, not only in Brazil, but also in many countries around the world. It is believed that this method can be the best option to achieve success in urban mobility projects. With the delegation of infrastructure investment projects to the private sector, greater speed, accountability and efficiency is expected in public spending.
The concept of evaluating freight transport with performance measures has gained the attention of both transport and logistic operators and policy makers. This consideration is further increased in the last few years due to the need to decrease the transport external costs, to take into account new activities/patterns of consumption by citizens, to make the transport activities more sustainable etc.. All these aspects are even more important if the urban context is considered, affected on turn by the increase of the demographic and urbanization process, the congestion of the main routes, the diffusion of pollutant emissions and related deterioration of air quality and human health. There exist a vast international literature in measuring the transport performances aimed in designing systemic and balanced performance measurement systems or flexibility measurement approaches. In this paper, the literature of approaches, techniques and indicators for chain performance evaluation of urban freight distribution activities are reviewed and described highlighting both advantages and disadvantages. To complement, for each performance evaluation method an application through a case study is illustrated. To do it, related studies appeared in the international literature are gathered and analyzed. The paper responses the following research questions: 1) Which performance evaluation indicators are mainly applied? 2) Which performance evaluation methods were prevalently applied? The critical state-of-the-art of the literature allows to put some lights on the definition of a good practice framework to measure and evaluate the freight distribution chains' performances with performance indicators. Urban cities strongly depend on freight transport networks that facilitate the massive flow of goods to, from, and within it. However, congestion, pollution and noise caused by the urban freight transport produce external costs and reduce the livability and accessibility of cities. Due to strong competition and increasing consumer demands, becoming over time also more demanding, transport companies try to reduce costs while simultaneously improving efficient consumer response. This leads to centralisation of warehouses and an increase in transport distances and frequency with an inevitable change in their performances. Every successful organisation needs to manage its assets effectively and benchmark its performance against that of its direct competitors. There are significant environmental pressures on operators in terms of engine emission limits, maximum noise levels and delivery restrictions placed on many retail sites. The development of freight performance indicators is emerging at the local, urban, state, national and European level. Measuring the urban transport distribution system is needed in order to improve logistical performance and reduce external impacts at the same time. However, the government agencies, the private sector and the citizens have to work together to address problems as mobility, reliability, safety, security, infrastructure management, environmental impacts, sustainability and economic growth; many actors involved with different needs, activities and features. This is more complex if the whole supply chain is take into account. Production or distribution firms do not operate in isolation but increasing within logistics chains whose commercial success does not depend only on the decisions that they take on, but also by the decisions of other members of the chain. The transfer of information, sharing of issues, coordinated research decisions and the level of integration achieved are some of the elements that determine the success of a chain. This integration level is at times so high that one cannot talk of competition between individual firms but of competition among supply chains. For this reason it is even more important, both for private operators and for public operators, understand how to operate a distribution chain, identify the role played in it by each actor and evaluate the overall performance of the chain in terms of profitability, risks, efficiency and effectiveness.
The Lazio Region’s Mobility, Transport, and Logistics Plan has the objective of reducing congestion and pollution in Rome. One of the worst polluters is freight distribution with diesel trucks. A strategic measure of the Plan is the use of the several rail stations inside the urban area of Rome as distribution centres. The project is called Roma Rail Logistics (RRL). The first part of this paper presents the project, which is still in a preliminary phase. The second part presents the data collection of a pilot study for the distribution to retailers in the historic centre of Rome with a transit point and electric vehicles. This data collection can provide data to the project on energy consumption of electric vehicles during their actual operative services and completes the data collected on diesel vehicles in a previous study (Alessandrini et al., 2012). The Centre for Transport and Logistics (CTL) is developing the Mobility, Transport, and Logistics Plan for the Lazio Region. The Rome Rail Logistics (RRL) project is an important element of the Plan. The project foresees using the rail network rather than trucks to transport freight within the city of Rome to Multimodal Urban Distribution Centres (MUDC) and thence by low- to zero-emissions vehicles. It foresees the use of rail for the urban distribution of freight in Rome. Several MUDC will be served by train from two freight villages north of Rome, one near the port of Civitavecchia and the other at Orte, an important transport hub. The MUDC will work as cross-docking distribution centres with minimum space. They will receive the freight from trains and will distribute it on low- or zero-impact vehicles. This will facilitate night distribution. The City of Rome opened the way towards a comprehensive policy that takes city logistics into account. With the 2008 Urban Master Plan, the city reserved land for multimodal logistics. The use of the train is not new to Rome. An earlier experience was managed by Omnia Logistica, a sister company of FS, the Italian Railways, which operated a logistics service for the city of Rome. The Logistics system was based on three freight villages, two in the North of Italy and one in the South, with multi-client block trains to the San Lorenzo urban freight terminal of Rome. There the railcars were unloaded and small trucks loaded for distribution. One hundred pallets were moved per day in a warehouse of 5500 m$^2$. Each delivery truck had a capacity of 8 tons and 12 pallets; diesel consumption was 4 km/litre. Six vehicles managed up to 21 deliveries per day for 40 retailers in two time windows, 10:00–12:30 and 15:30–19:00. The main kinds of freight carried were: a) Mineral water; b) Paper and products; c) Fruit juice and preserved foods; d) Miscellaneous non-food products for large retailers; e) Cement.

**RRL project rail network and MUDC** The Lazio rail network is centred on Rome. The logistics system is based on a rail line to and from the freight village near the port of Civitavecchia, crossing the urban area of Rome with stops at six MUDC, operating in cross docking, to the freight village of Orte, north of Rome. The catchment area is the entire urban area of Rome inside the outer ring road, with a population of 2 million. A 4PL provider orchestrates the entire supply chain from the suppliers to the retailers or, for online commerce, the final consumer. The 4PL is a consulting firm specialising in logistics, transport, and supply chain management. It must be an independent, accountable, non-asset based integrator of a client’s supply and demand chains. The resupply orders of individual retailers and consumers in the city of Rome are transmitted to the suppliers and MUDC by the 4PL, served by RL, and consolidated in a daily overall order which is sent to suppliers with a lead time of three days to two weeks, according to type of freight and distance from the suppliers. The suppliers coming from the north transport their freight by train or truck to two freight villages or by ship to Civitavecchia. Suppliers in Lazio and the South of Italy transport freight by train or truck to the Roma Smistamento MUDC by 18:00 the evening before the delivery day. In the two freight villages goods are packed on multi-product pallets, which are directed to the final retailer. The pallets are thus loaded by the operators on rail convoys by means of forklifts and are subsequently transported to cross-docking warehouses in the city during the night. The pallets are transferred to electric or methane-powered vehicles with a maximum capacity of 8 tons and 12 pallets. Most cross-docking takes place in the morning.
An Urban Distribution Center (UDC) is an useful City Logistics policy instrument. An UDC can produce interesting impacts on the dynamics of urban freight distribution, but its success depends on many factors: an appropriate location; a well-balanced presence of spaces and equipment; an efficient and effective organization of internal services; a connection with the surrounding area and with the related transport services; a management structure that meets different and complementary requirements; a capacity to support itself.

The paper proposes a methodology for evaluation of UDC operational capacity based on a micro-simulation approach. In literature the operational capacity is mainly defined in two different ways, depending on whether the terminal system is considered as a whole or single elements of the productive chain are taken into account. In the former case, the capacity is defined as "the possibility of assuring the treatment of a certain quantity of goods in a specified period of time" (UNCTAD, 1980; National Ports Council of Great Britain, 2004). In the latter case, the capacity is defined as a vector whose elements represent the capacity of the different functional areas that constitute the terminal supply. In other words, the capacity is defined at a micro level taking into consideration the operational characteristics and the capacity of each functional subsystem and the relationships they have with each other. From this point of view, the capacity of the freight terminal should not be meant as the maximum point of production, but as a combination of various productive factors which characterize the operation and functionality of the node (Brennan, 2001; Gaur, 2005; One Stone Consulting Group, 2006).

The proposed methodology is defined according to typical supply system of UDC. It foresees the determination, by using appropriate functions of the single operative elements capacity. The analysis of UDC capacity has been realized by using a discrete-event micro-simulation model. The simulation allows the evaluation of the operational capacity of existing UDC or to be made, by offering managers summary indicators to support decisions related to planning activities at different levels (strategic, tactical and operational). The model allows, through "what if" and/or "what to" procedures, the analysis of the operational capacity of UDC according the node working conditions and to the managerial policy adopted by the terminal operator. An UDC can be defined as "a logistic platform for the centralized management of takings and deliveries, which is aimed at goods distribution in an urban area through the aggregation of freight flows and the optimization of routes" (Da Rios and Gattuso 2003). In other words, an UDC is a logistic platform of cross-docking where goods directed to an urban area are received and distributed and groupage/degroupage activities are carried out. In order to highlight the physical and operational components of an UDC, the supply has been represented by block diagrams. In this perspective, the structure of a logistic site can be schematized in 6 macro-functional areas operating in sequence:

- **gatehouse**, composed of a parking area to receive trucks arriving and waiting for service;
- **input docks**, reserved for trucks from suppliers and for loads of goods that are destined to end customers located in urban area;
- **receipt area**, sized to ensure the unloading of goods, the qualitative and quantitative controls and the possible labeling for the sorting of inbound goods;
- **warehouse**, organized to store the sorted goods;
- **composition area**, sized to ensure the formation of outbound load units and the loading of the vehicles used for secondary distribution;
- **output docks**, reserved for the vehicles which are utilized for the secondary transport and represent the final distribution link.
ID 26: Behavior change and urban freight: new possibilities

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The Netherlands Institute for Transport Policy Analysis (KiM) performs at the request of the Ministry of Infrastructure, Directorate of Roads and Traffic Safety an exploration of the impact of new developments in the urban supply domain and the possible role of the (national) government in this field. In this project, the question is whether new developments may lead to reconsider the role of the national government, in particular the Ministry of Infrastructure, in respect of supply in cities. The research is scheduled for April – August 2015, in October we would be able to present the first results. The basis for the project are recommended behavioral interventions in “best practices” found in different countries. These behavioral interventions will require further deepening. We do this by means of three steps.

1. More in-depth analysis of the identified best practices.
   In the project we look at psychological, economic, social and institutional factors that play a role in new developments in urban freight. The emphasis is placed on the behavioral mechanisms in (non-Dutch) best practices. We will focus on 4-6 cases that seem promising from a behavioral perspective. These cases are discussed in a work session with behavioral experts. The approach to identify the behavioral mechanisms is the same as in the study Grip op gedrag (Grip on behavior) (Tertoolen et al., 2013). In this study over 100 mobility projects and measures were analyzed. Based on availability of literature, an evaluation (report) and the (estimated) potential of the case, cases were selected which were considered promising for further behavioral analysis. On a limited number of cases an in-depth analysis was conducted. This was done with help of the so called DOE approach with three elements: understanding, designing and experience (or evaluation).

2. Analysis of the two Dutch cases
   To see whether the behavioral mechanisms can be applied to the Dutch situation we will explore two cases, such as Amsterdam and Groningen. We will map the stakeholders involved and the behavior displayed by the actors and the economic, social and institutional context (part of the behavior analysis framework).

Actor analysis

Urban freight is associated with various problems such as congestion, air quality (particulate matter), noise pollution and the safety of cyclists and pedestrians. For these problems, different solutions have been proposed. The solutions are for example in the field of regulation (handling time windows, restrictions on the weight and size of vehicles, set up low emission zones), pricing, setting logistic areas on the edges of cities, infrastructure measures (designating specific loading zones or making better use of waterways), technology (ICT and ITS) and new forms of cooperation. The best solution may not be more regulation, but in consultation (with the aim of bundling goods flows) (MDS Transmodal Limited, 2012; Ploos van Amstel et al., 2014). We know from various analyzes that the urban freight domain has many different stakeholders: municipal administrators, residents, tourists / visitors, retailers, carriers / transporters and producers. All parties with their own preferences and interests.

The problems in the two cities are mapped on the basis of the following questions:
• What issues are at play in the fields of urban distribution? How controversial are they? What issue is dominant?
• Which actors are involved in the dominant issue?
• What are the positions of the parties and which interests are affected?
• How do the parties relate to each other? Here we look at relationships of power and influence. What does the network of actors look like? Who are central in the network, who belong to the periphery? Are there discernible relationship patterns? (Evers, 1993). Answering these questions is relevant because it provides insight into the bargaining position of the parties (Borgatti et al., 2009).
So far academics and public officials have mainly focused on some specific aspects of the City Logistics (CL) notion, such as socio-economic and environmental impact, evaluation of policy measures (Yamada & Taniguchi, 2005) or freight demand modeling (Nuzzolo and Comi, 2014). Several pilot projects worldwide proved to be successful, satisfying the stakeholders involved and reducing the negative impacts generated by urban freight distribution. These initiatives are completing the early stages of implementation and entering a scaling up phase. In this context, we believe that it is necessary to understand the factors that enhance the scaling up process of CL initiatives. This process can take different forms, according to the initial starting point. For example, a successful implementation on a delimited area could be extended to larger areas; a project that involved a selected number of stakeholders could be extended by involving more stakeholders. Analysing the business models of CL initiatives that show a consolidated path towards their extension to larger areas can provide some additional elements to the goal of highlighting recurring factors that can be taken as best practice or common patterns that have emerged. However, only few recent academic papers have investigated CL initiatives and innovations from a more business oriented point of view, and to our best knowledge there is a lack of works that tackle this issue by exploring a variety of international existing practices. Therefore, the present work contributes to bridge this research gap, investigating CL schemes and initiatives from a perspective that takes into account the main business-related aspects to a greater extent. This perspective can highlight the factors that make CL initiatives not only successful from an operative point of view, but also profitable for private entrepreneurs and stakeholders. The enabling factors for the scaling up of CL initiatives will be investigated qualitatively via the application of a conceptual framework to selected practices in CL. The framework of analysis will be developed following a deductive approach, by integrating the dimensions that compose a business model with the operational dimensions and the performance indicators of a CL scheme, retrieved from pertinent literature. In this sense, we will build on previous academic papers focused on the classification of business models of CL systems, namely the works by Benjelloun et al. (2010), Leonardi et al. (2014) and Quak et al. (2014). When considering business models for CL, the specific features of CL have to be taken into account. For instance, the plurality of stakeholders involved from the design process in CL makes the identification of a customer value proposition less clear, since we refer to stakeholders involved in the process rather than customer segments to whom a company is delivering its value proposition. The framework is developed as a phased classification framework. The upper level is composed by the main pillars of a business model, such as the followings:

- offered services, mainly distribution, warehousing, consulting, etc.;
- operative modes of delivering the services, such as third-party or direct delivery;
- key stakeholders/customer segments;
- value proposition and benefits for stakeholders;
- cost structure, divided in operating costs and investments;
- revenue streams, which can be variable (e.g. capacity dependent prices) or fixed (e.g. subscription to a service).

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ID 30: GoodTrip application potential for solution of urban logistics problems


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The Urban Mobility is the result of the interaction between people and freight movement in the city, and presents itself as one of the main challenges of large cities around the world (Brasil, 2007). When these challenges are analyzed from the viewpoint of City Logistic (Taniguchi et al., 2001), it is possible to see that the problem is the difficulty of understanding the freight transportation demand (which involves movement of goods, parcels etc.) in the urban context and its relationship with the mobility of people. In this context, Lima Jr. (2015) identified four major challenges facing the City Logistic observed during the application of focus groups that the CLUB Centro de Logística Urbana do Brasil (Brazil’s Urban Logistics Center, translated into English) has been doing the last three years in different cities of Latin America, and with greater intensity in Brazilian cities. The first challenge is relate to the Hub Cities that means cities with global participation, usually with large ports and airports, which have a number of specific urban logistics issues relevant to the global connection. This is because the intense freight flow demand through these global cities. The second challenge surpass the specific problems of city centers, especially when some preserve historical heritage. Narrow streets and vibration restrictions limit and hinder the movement of vehicles. The third challenge is the Logistics Clusters, which spreads by different neighborhoods in the city, and create intense logistics activity stains that are degrading the quality of life of their surroundings. Finally, the fourth and perhaps most important challenge is the logistics operations in the slums and communities, which in some cases account for a large portion of the area inhabited in the city. Faced with problems related to urban mobility, researchers have made efforts to develop analytical methods for the proposition of strategies and solutions to the reality in which it is intend to work. One approach toward the understanding of travel demand that has been gaining acceptance of researchers, but not explored in freight transportation studies is the Trip Chain. A Trip Chain is a Travel Behaviour approach that had an origin in the 1970s, from the spatiotemporal nature studies of Hägerstrand (Button, 2005). It is based on a theoretical framework in which the analysis of the demand for travel begins by understanding how and why the activities that motivate them are carried out in a particular time and space (Jones, 1977). It assumes that individual behavior is embedded in a complex system of constraints arising from a range of needs and requirements for human interaction (such as conventions and cultural norms, legal and organizational), which guide its decision to use of their spatiotemporal budget available for the execution of the activity / trip, in a particular environment (Schönfelder and Axhausen, 2010). Boerkamps et al (2010) discussed the application of TripChain to the context of urban transport loads. These researchers proposed a model called GoodTrip, in order to predict flow of goods and vehicles flows and outline a conceptual framework that he considered the market actors and elements of the chain of loads of supplies, with application in the Netherlands. Samimi et al (2009) explain that the GoodTrip provided reliable estimates for flows of freight and vehicles, and was used in other cases to analyze other distribution systems of alternative urban freights (e.g de Jong and Ben-Akiva). These studies discussed potential sources of data for the GoodTrip, including additional research and general framework, but did not provide specific conclusions. In this context, this study aims to broaden the discussion on the application potential of GoodTrip, especially as a solution to urban logistics problems. The study was conducted in three stages. In the first stage, an analysis was made of the application GoodTrip in the literature by applying the methodology (RS) and Meta-synthesis. The RS is a rigorous methodology, usually adopted in health care, which aims to identify studies on a topic in question (De la Torre-Ugarte-Guanilo et al, 2011).
The paper illustrates the design and preliminary results of an integrated framework for urban freight data collection, under development in the pilot test-site of Singapore, based on next-generation sensing/surveying capabilities to enable future modelling and policy-making in urban freight systems. Specifically, primary objective of the research is to develop proof-of-concept of a coherent, scalable and holistic collection of all freight data (production, logistics, transport), with the aim of tracking vehicles and shipments and for surveying relevant freight agents, leveraging state-of-the-art sensing technologies and approaches, obtaining unprecedented urban freight data. The research is motivated by the strong simplifying assumptions and limited behavioural foundations of current modelling and policy-making for urban freight: the explanatory power of existing freight models is limited by lack of data, implying many feasibility studies and subsequent policies and investments to be based on biased forecasts. Various research groups are active worldwide in urban freight research. In Europe, the BESTUFS project (http://www.bestufs.net) is one of the best known projects on urban freight, including data harmonization and a published Good Practice Guide on Urban Freight. The Volvo Research and Educational Foundations Center of Excellence on Sustainable Urban Freight (https://www.coe-sufs.org), and the related MetroFreight consortium (http://www.metrans.org/metrofreight) were established in 2013. Their primary objective is urban freight research, education and outreach, and a state-of-the-art data collection effort was carried out in Paris, encompassing an establishment survey, a delivery truck driver survey and major transport companies survey. Other similar data collection methods are being designed for Los Angeles, New York, and Seoul (Seo and Lee, 2014), along with freight-specific policy design case-studies. While some technologies are deployed in this effort, such as GPS for tracking a sample of vehicles, this data collection effort is still traditional with no consistent and integrated modelling effort as yet. In terms of solutions and policy-making, it is worth mentioning the leading-edge pilot case studies for consolidation centres and off-peak deliveries in New York, by the group led by Prof. Holguin-Veras. In Japan, the Tokyo Metropolitan Freight Survey (TMFS) in 2003 involved a questionnaire survey to logistics establishments, to large truck drivers and a local delivery survey of loading/unloading activities in the Central Business District (CBD). Finally, it is worth mentioning the modelling activity by the research group at Kyoto University under the supervision of Prof. E. Taniguchi (Hyodo et al, 2007).

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ID 33: Analyzing stakeholder’s commitment in urban logistics projects by using Community of Practice theory

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For fifteen years, changes in consumption patterns and economic development of cities and regions contributed to an increase in the volume of trade between territories and within city centers. These exchanges are performed by a combination of transport (road, air, rail, river and sea) and warehouses, whose interactions and sizing must necessarily be controlled in order to meet the ever-increasing demand and to cope with the issues associated with urban logistics. Urban logistics represents about 30% of the flows in a city and covers all the activities involved in freight transport and distribution in urban areas, including the movement of goods in the heart of cities, their treatment in these territories, their delivery to the final customer and also the reverse flow (returned products, recycle and waste) (Laubard and Lissorgues, 2010; Patier and Routhier, 2009). Its main objective is to better organize the actors who contribute to the deliveries by combining data, resources and infrastructures (Dablanc, 2006). Urban logistics is a recent field of research which requires considering multiple stakeholders whose objectives may diverge but who share the same issues: environmental (various pollutions: air, congestion, noise...), economic (dynamism and attractiveness of territories), societal (adaptation of the city to new patterns of consumption), and architectural (urban infrastructure) (Armand et al., 2013). There is a broad consensus on the fact that it is through new organizations and better integration of urban freight in the city that these issues will be overcome (Quak, 2011). That means that a strong engagement of the different stakeholders has to be managed to ensure the implementation of lasting solutions. Given the importance of the challenges and the plurality of interacting actors, inter-organizational communities that gradually emerge in different cities are mostly of mixed nature, and can be analyzed through the lens of communities of practice (CoP). Our objective is to understand the conditions of emergence and durability of such communities by using an exploratory case study conducted through participant observation. A community of practice, according to the definition given by Wenger et al. (2002), is a ‘group of individuals participating in communal activity, and experiencing/continuously creating their shared identity through engaging in and contributing to the practices of their communities’. This group interacts and collectively builds relationships and a sense of belonging to the community as well as mutual commitment. Observing these interactions and understanding the nature of the engagement of stakeholders in the context of urban logistics projects is of particular relevance to the cities in the future. Communities of practice, well organized and well used, appear to be an effective learning tool in the context of urban logistics. These learning has primarily the interest of being "located" according to Lave and Wenger (1991), meaning that the concerns of "learners" and the logic of their questioning is taken into account. This learning in action and from action creates the sense of belonging for the community members (Amin and Roberts, 2008; Dillenburg et al., 2003). Learning will also often have important organizational consequences, and leads evolution of formal routines (rules, procedures, structural configurations, etc.) and informal ones (beliefs, values, mental representations, etc.) of the members. Moreover, it also encourages a better coordination of actions (Sonntag, 2009). All of these features seem particularly useful to analyze stakeholder engagement in urban logistics projects. Indeed, such projects bring together actors who have only partial knowledge of the different issues, and where no single actor can bring a global solution by itself. We want to focus on how collaboration can be built through the creation of a community of practice integrating the different stakeholders in such a context, in order to implement innovative and sustainable schemes that respond to the above recalled issues. In urban logistic projects, two circles of stakeholders can be distinguished: those directly involved in urban logistic plans, and those who represent the interests of a particular audience (Chanut et al., 2012). The first circle integrates usual distribution channel members including flows’ generators (manufacturers and distributors in the retail industry, pure players, wholesalers and professional users), flows’ managers and actors operating flows (third party logistics service providers, package carriers and public transport) and flows’ regulators (cities and local authorities).

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Real-life experiences and the media abound in decision making failures for freight transportation. Examples include contrasted transport infrastructures (e.g. ports; intermodal transport terminal) and the related extra-costs, unrealistic business plans for freight transport companies, and so on. Problems in effective transport-related decision making are also related to the gap still existing between the traditional technical approach to transportation planning and design, and real-life processes. Obviously the complexity of decision processes in freight transportation has long been recognized together with the need of “opening” them and widening the consensus around alternative courses of action. However most of the contributions in the freight transportation literature assume that the decision making process has some form of “rationality” and that quantitative tools play a central role in it, contributing to define the decisions or at least influencing them. In this paper we argued that unfortunately sometimes, decisions on (urban) freight may be “a-rational” and quantitative methods are not used or are used in a purely “cosmetic” way. The quality of the decisions depends critically on the process followed to reach them. Planning and designing freight transportation systems should expressly be recognized as managing complex, multi-agent decision-making processes in which technical and communication abilities should both be involved in order to design solutions which are consistent, and at the same time, maximize stakeholders’ consensus.

In this paper we propose an approach to urban freight planning and designing based on three parallel and intertwined processes: a) a cognitive rational approach to the organization of the decision-making process; b) a five levels stakeholders engagement process; c) a technical analyses process based on an extended role of quantitative methods. Furthermore an application case study was also performed. Bounded rationality in individuals’ decision-making assumes that rationality is limited by the available information, their cognitive limitations, and the finite amount of time they have to make a decision. Therefore, individuals choose an alternative which is satisfying, learning from previous choices. Accordingly with this ideas, the model proposed here for decision making related to freight transportation system assumes that actors are still goal-oriented, but they implicitly take into account their cognitive limitations in attempting to achieve those goals. The decision-making model is intrinsically dynamic with several feedback loops adapting the “solutions” to their ability to satisfy objectives and constraints until reaching a “satisfactory” level of compliance. Further, the problem setting may be revised if solution satisfying previously set objectives and constraints are not found within reasonable time and resource budgets. The concept of satisfaction is necessary a fuzzy one, as no single value objective function can be referred to, and even non-quantitative objectives and constraints are included in the process. The model is “cognitive” in nature since actors learn about solutions and their effects, the achievable objectives, the possible trade-offs, during the decision-making process. It also includes the possibility of decomposing decisions in sub-sequent steps, implementing subsets of them and “learning” from their effects, both at the decision-maker and stakeholders levels. The results is a multi-step decision process based on the outputs from previous decisions monitoring and ex-post evaluations. Stakeholder Engagement (SE) can be considered as the process of involving stakeholder concerns, needs and values in the transport decision-making process. It is a two-way communication process that provides a mechanism for exchanging information and promoting stakeholder interaction with formal decision-makers and the transport project team.
There is no doubt that urban freight significantly contributes to the wealth of cities and urban economies. However, even urban freight constitutes a relatively small proportion of urban transport, its negative impacts (e.g. road congestion, air quality issues, noise etc.) are disproportionally high. Therefore transport policy defines ever more challenging goals such as CO2-free urban logistics [EU, 2011]. A number of reasons has led transport policy to change its strategy from "predict and provide" to demand management, i.e. measures that are tailored to specific actors to alter their behaviour by changing their transport context. However, these measures need to be evaluated in advance to identify their effects on the transport System and the environment and to identify winners and losers of such measures. Thus, models are required that can map high spatial resolutions, the interactions of passenger and freight in constrained physical networks, the ever-increasing heterogeneousness in urban freight transport (logistics) and behavioural adaptations to policy measures. This constitutes a major challenge for transportation research. A couple of models map urban commercial vehicle flows as a whole. Most of them focus on constructing tours and activity chains (e.g. Himt and Stefan [2007] and Johan W. Joubert and Axhausen [2010]). They are well defined to support classical transport planning. Once it comes to the assessment of measures tailored to individual, their sensitivity is still limited. One reason is that these models focus on individual vehicle movements rather than logistics behaviour yielding to these movements. City logistics models address logistics behaviour and seek to optimise "the logistics and transport activities by private companies in urban areas while considering the traffic environment, traffic congestion and energy consumption within the framework of a free market economy" [Taniguchi et al., 2001] (see Taniguchi et al. [2014] for recent trends). The traffic environment and traffic congestion in these models are mostly represented by exogenous parameters. A number of policy measures, however, impact the whole transport System, e.g. a prohibition for heavy vehicles in the city centre, and thus influence these exogenous parameters itself. One way to deal with these interdependencies is to consider some of them within the model. This, however, requires models with high spatial and temporal resolution that can map both passenger and freight transport. Such models are still scarce. We developed a multi-agent freight transport simulation and integrated it into an existing passenger simulation to model both passenger and freight actors (Schröder et al. [2012] and Schröder and Liedtke [2014]). The objective of this paper is twofold. First, we study the sensitivity of this model according differentiated policy measures. Second, we analyse different strategy configurations and their impact on the model outcome and performance. This work is part of integrating freight carriers as autonomous agents in a multi-agent transport simulation called MATSim. MATSim-Freight consists of a traffic simulation and microscopic demand models for passengers and freight. The traffic simulation is based on a queue model that simulates the movement of individual travellers and commercial truck drivers in the physical System. The demand models captures the reasons behind actual movements, i.e. the choice dimensions to "efficiently" conduct activities. Since the modelled actors have different preferences and goals as well as different capabilities, each actor is in the model represented by an unique agent. The decisions of each agent are encoded in an agent's plan. The traffic simulation then executes these plans con-currently. Congestion effects and resulting delayed arrival times are fed back into the demand models where agents can evaluate their plans. They evaluate their plan with individual utility/cost functions quantifying for example travel times and distances, activity durations as well as delayed arrival times (this is step is called scoring). In the course of a model run, each agent can improve its plan by modifying an existing one. Based on the agent's experiences in previous iterations, it can choose for example another route, another transport mode, it can shift activities' departure times or when it comes to freight transport it can choose whole new activity sequences. These decisions yield new plans, thus, this step is referred to as re-planning. A traffic equilibrium is achieved by the iterations of three steps: (re-)planning, physical traffic simulation, scoring.
Stockholm is a fast growing city in Europe, and the demand for goods that need to be distributed increases constantly. Studies show that commercial traffic is a major contributor to peak-period congestion in metropolitan areas throughout the world. Several large cities have started to examine the effects by shifting goods deliveries from peak to off-peak hours, targeting receivers and carriers of goods in urban areas. Successful examples include the New York City Off-hour Delivery Project (Holguin-Veras et al, 2011) and the freight transport legacy in London during the Olympic Games in 2012 (Browne, M., et al. 2014). Shifting commercial vehicle deliveries from daytime to off-peak hours is a challenging task since it involves many interacting stakeholders. The transport carriers and receivers are identified as the key stakeholders (Holguin-Veras et al, 2005). Results from previous studies showed potential benefits in switching goods deliveries to off-peak hours. Examples of the benefits are for instance reduced waiting time for deliveries from the perspective of receivers, and for the goods carriers off-peak deliveries means higher productivity, less fuel costs and reduced number of trucks and crews. Furthermore, the drivers can complete the same delivery route in less time during off-peak hours, and the loading/unloading times reduce significantly. The City of Stockholm initialized the Off-peak goods transport project in 2014 in order to achieve a more efficient and environmental-friendly delivery system. One hybrid electric/diesel truck equipped with silent technology is given permit to deliver goods during off-hours in the Stockholm inner city. Transport efficiency, environmental impacts and noise levels are the main factors that are measured and evaluated continuously during the project period. This paper examines the preliminary results obtained from the pilot study in terms of transport efficiency by transferring goods deliveries from the peak to the off-peak hours in urban areas in Stockholm. The hypothesis to be tested in this study is that transport efficiency is higher during off-peak hours compared to peak hours; in particular that average driving speeds are higher, that arrival times at the receivers are more reliable, and that unloading times are shorter. Analytical modeling and a comprehensive dataset collected during the project period are employed to understand the impact of off-peak deliveries on transport efficiency.

The dataset used in our analysis includes multiple types of data:

- high-frequency (1 Hz) Global Positioning System (GPS) records from the delivery vehicle,
- event-based records of the vehicle/driver status, including fuel consumption, from the fleet management system,
- information regarding the transported goods from the goods receivers (grocery stores),
- link speed in the Stockholm road network throughout different times of day, estimated from probe vehicle data.

Indicators such as average driving speed (from warehouse to customer and from customer to customer), driving time, service time (time spent at customer location making deliveries), vehicle kilometers traveled, vehicle hours traveled, delivered volume per hour and km, and fuel consumption are examined. Service time is studied here since it provides an insight into delays associated with deliveries (looking for parking, waiting for person to receive delivery, loading and unloading, etc.).

Increased travel times and uncertainty caused by congestion affect the efficiency of logistic operations (Figliozzi, M. A., 2010). Data from the off-peak truck are evaluated against data from probe vehicle data from the same route during regular hours. The impact of congestion is evaluated regarding:

- the change in average travel time
- the change in travel time and arrival time variability
- the interaction effect between a simultaneous decrease in average travel time and variability
Transportation models are important tools for planners to evaluate infrastructure plans and policies. While there are many sophisticated travel demand models to evaluate policy impacts on passengers, most planners lack tools to evaluate the impact of policies on logistics before the policies are implemented. Policies that are implemented without careful analyses can be difficult to enforce, impose unsustainable logistics operation costs, (Benjelloun & Crainic, 2009; Dablanc, 2011; Danielis, Maggi, Rotaris, & Valeri, 2013) or have adverse environmental impact (Quak & de Koster, 2009; Zambuzi, Cunha, Blanco, Yoshizaki, & Carvalho, 2013), thus it is important to develop freight demand models that can be used to understand and predict policy impact on freight transportation. It is necessary to consider behavioral changes when policies have complicated impacts on stakeholders’ decisions. Microsimulations based on behavioral models are commonly used to understand how city planning and transportation policies affect traveling behaviors (Ben-Akiva & Lerman, 1985; Miller, 2014). In freight transportation, behavioral models had been used to understand stakeholders’ reactions to policies such as off-peak hour deliveries (Silas & Holguín-Veras, 2009) and mixed regulations (Stathopoulos, Valeri, & Marcucci, 2012). Behavioral models had also been used to understand and predict decisions related to freight transportation, such as warehouse and supplier choice (Wisetjindawat, Yamamoto, & Marchal, 2012), service type (Nuzzolo & Comi, 2014; Nuzzolo, Crisalli, & Comi, 2012), timing of deliveries, mode choice (Wang & Hu, 2012), and route choice (Hunt & Stefan, 2007; Ruan, Lin, & Kawamura, 2012; Wang & Holguín-Veras, 2009). However, to authors’ knowledge, no publication has proposed a complete disaggregate urban freight transportation model integrated with all the decisions that constitutes the system. Behavioral models are heavily dependent on revealed or stated preference data. Such data may be easier to collect from passengers because an individual or household makes all the decisions, but on the other hand, the travel decision of a single freight vehicle is the result of a cascade of decisions of multiple actors who are informed with subsets of information. This cascade of decisions increases the complexity in developing behavioral freight transportation model because the interactions between actors (Lawson et al., 2012; Roorda, Cavalcante, McCabe, & Kwan, 2010), and the timeframes of the decisions may not be consistent across companies and businesses even if they belong to the same industry. Currently few policy-oriented papers connect directly with freight transportation system simulation models. The objective of this study is to construct a framework of decisions that generates the freight transportation system, and define these decisions by their actors, time and geographical scales. The decisions would be dependent on quantifiable variables that are directly related to urban freight transportation policy levers, such as vehicle size restrictions, and wage levies. This model covers within-day routing decisions to monthly and annually strategies, such as the vehicle fleet and mode selection, taking longer term decisions such as location choice as given. It is not in the scope of this paper to prescribe policies or regulations to a city, and readers referred to (Center of Excellence for Sustainable Urban Freight Systems, 2013; MDS Transmodal Limited & Centro di ricerca per il Trasporto e la Logistica, 2012) for guidance. Ideal outputs from the all urban freight transportation demand model for the purpose of policy evaluation, regardless of level of aggregation, are the estimates of the costs and benefits for firms and the society. These include the externalities generated from dynamic interactions between passengers and freight agents. Presently there are several microsimulation models that simulate passengers long term and/or short term decision patterns to understand and predict mobility preferences, such as ALBATROSS (Arentze & Timmermans, 2004), TASHA (Roorda, Miller, & Nurul Habib, 2008), SimAgent (Bhat, Guo, Srinivasan, & Sivakumar, 2004), and SimMobility ((Lu et al., 2015)). The freight transportation model framework proposed in this work will be compatible with the modeling structure of SimMobility.
Public participation is an essential part of planning according to sustainability principles. Transport systems require special attention, in particular at the urban scale, since their planning affects the liveability and economy of a city and usually there are many stakeholders with conflicting objectives. In this respect, it is fundamental to involve citizens and all the interested stakeholders, both from the point of view of passenger and urban freight transport (UFT) policies. In particular, UFT stakeholders go from the private side (retailers, private companies, transport providers) to the public one (end consumers, citizens, public authorities) with diverging interests (economic sustainability vs environmental and social sustainability) and multiple decision-makers. It has been demonstrated via an agent-specific approach (Stathopoulos et al., 2012; Gatta and Marcucci, 2014) that knowing behavioural aspects related to stakeholders can increase decision-makers’ awareness and help them taking better decisions. Moreover, a transparent and inclusive decision-making process can help taking the ‘most shared’ decisions rather than the ‘best’ one. In the framework of public participation, identifying all the actors and listening to their different points of view are the first two primary steps (Cascetta and Pagliara, 2013), followed by the real participation phases. The interaction among stakeholders and between them and the decision-maker(s) is a crucial point, since it influences the final decision, and a good management of it is fundamental for the success of the decision-making process. Moreover, an extended use of Multi Criteria Decision Analysis (MCDA) methods to include and quantify stakeholders’ opinions is advisable to add transparency to the process (Macharis, 2005). However, if this kinds of participation are not monitored, they can hide some pitfalls. When stakeholders are asked to rank different alternatives there can be two main problems connected with the final collective preference order that derives from aggregation: (1) it cannot reflect the individual preferences and (2) it can be intransitive, i.e. it is possible to fall into the so called ‘Condorcet paradox’ or ‘Condorcet cycle’ (Condorcet, 1785). This means that, for instance, among three alternatives A, B and C, the collective preference order can be A>B>C>A. It is important to understand how to manage this kind of problems avoiding the unfeasibility and unfairness of a decision that derives from a democratic but uncontrolled participation. To this purpose, a methodology that investigates the complex phenomenon of interaction in group decision-making has been set up. Agent-based simulation is used to model networks of stakeholders (agents) endowed with own properties (such as opinion or influence) that can act according to simple behavioral laws, reproducing the opinion exchange flows. The simulation is supported by the theory of Social Network Analysis (SNA) and opinion dynamics models, the former to provide insight on the relative influence/importance of stakeholders and the latter to reproduce the interaction among them in order to make predictions about the final decision (Le Pira et al., 2013). In particular, from typical UFT stakeholders, homogeneous communities can be identified on the base of the similarities of interests and the process of preference ranking can be simulated. The opinion dynamics model is based on majority rule, since each agent at time $t$ can interact with its neighbors and decide to change its opinion according to the preference order of the majority of them. The Pairwise Majority Rule (PMR) is used as aggregation procedure of individual preference lists and the degree of consensus is monitored in terms of overlap between the lists (Le Pira et al., 2015). The simulations are performed within the software environment NetLogo (https://ccl.northwestern.edu/netlogo), particularly suitable for agent-based modeling. The results show that the model is able to suggest to what extent interaction supports a consistent and transparent group decision-making process. It is confirmed that, starting from an intransitive collective list, it helps to escape from the ‘Condorcet cycle’, as already demonstrated (Raffaelli and Marsili, 2005; Columbu et al., 2007).
Urban freight transport in Brussels Capital Region is a key concern of local public authorities and private stakeholders. On private side, recent years have seen the emergence of several sustainable freight operators and several urban consolidation centres servicing the region and run by private companies. Some of these centres have benefited from a limited support of public stakeholders while others are completely self-sustaining. On the public side, the urban freight transport has benefited from a growing concern. The Strategic Plan for Urban Freight Transport in Brussels-Capital Region (Bruxelles Mobilité, 2012) published in 2012 is in fact a first policy document addressing specifically the question of urban freight in Brussels. This document proposes a series of measures to decrease the environmental impact of urban freight transport, addressing the questions of infrastructure, organization, regulation or land-use planning. One of the key measures proposed in this document is the establishment of a logistical pole at a tri-modal site Schaerbeek Formation as well as the establishment of a network of urban consolidation centres (UCCs) servicing the Region.

A series of other measures such as distance based freight pricing or off-hour deliveries are being investigated to decrease the vehicles kilometres in the urban area and, indirectly, to promote the use of the logistical zone and the urban freight consolidation centres. However, regardless the presumed environmental benefits of these measures, little attention has been given to the resulting carrier response. In fact, the setting-up of these new measures lead to a series of questions: (1) what are the current characteristics of deliveries in the region? (2) what is the current cost of delivering in the region? (3) what impact will the introduction of the distance-based freight pricing have on the cost of deliveries? (4) what is the price per delivery that could be charged for UCC services? (5) which portion of carriers will use: the UCC or the off-hour deliveries? In order to answer these questions, this paper presents a model that was developed to test the carrier response on the aforementioned policies. This paper presents a model that was developed to test the theoretical carrier response to the new policies in Brussels-Capital Region. The model uses data on freight flows that was gathered within the LaMiLo (Last Mile Logistics) project using the FRETURB software, a software for diagnosing the urban goods movements. The model was calibrated with an establishment survey run among 3000 companies in Brussels. The results of this project represented an opportunity to study the carrier’s response in a quantitative manner. The first step of the study is the adjustment of the data. In fact, FRETURB software does not allow obtaining information about the origins and destinations of the commodities but rather provides information about the origin and destinations of the freight movements. It is also not possible to obtain information regarding the form of tours (or their direction) made by the specific freight trip. A series of adjustments for the data were therefore necessary in order to make this data suitable for our model. FRETURB model does however allow a very detailed description of the freight movements. In fact, the model outputs characterizes the freight movements according to: (1) the type of vehicle (light goods vehicles, trucks, trailers and semi-trailers), (2) the management mode (own account shipper, own account receiver, and hired transport), (3) the type or organization (direct trips or tours), (4) the size of the tour (six categories according to the number of points served), (5) the activity sectors (8 different categories), (6) the type of movement (principal or ordinary movement according to the position of the movement within a tour) and (7) the origin and the destination of the movement. The analysis of the data from the FRETURB model allowed providing a very detailed characterization of freight trips in the Brussels-Capital region that will serve as one of the inputs for the carrier-response model. For example, by using characteristics of the flows from the FRETURB model in combination with information about the distance and driving-time gathered through Google Maps API, it was possible to highlight the main characteristics of freight movements for each specific segment (for example, management mode, vehicles and sectors). This has allowed highlighting a series of elements such as average movement distance, average driving time, geographical concentration of origins of the flows, etc. The result was that the main variability was linked to the type of vehicle, the management mode, the type of organization and the size of the tour rather than the sector.
Freight mobility in urban areas represents to a growing extent a major challenge for modern cities in Europe. While the urban population and – inherently – the demand for goods grows steadily, the need to organise freight movements in an efficient and sustainable way is pressing. Europe’s logistics sector faces the tremendous challenge to halve its fossil fuel use and greenhouse gas emissions, while catering in a cost-effective way for goods transportation in the next decades (Smokers, Tavasszy, Chen & Guis, 2014). In the Belgian region of Flanders, representatives of both policy and industry initiated a number of activities in order to address this need. However, for local authorities to introduce competent solutions, correctly estimating the effect of these solutions on the city’s main concerns is crucial. Two difficulties currently impede a sustainable mobility evaluation at the local city level. Firstly, a gap exists in suitable urban freight sustainability indicators that fit the context. Secondly, local authorities in charge of urban mobility solutions generally lack the required skills and/or funds to individually collect, process, analyse and implement data-sets. Therefore, the abstract first proposes the identification of appropriate indicators for evaluating the sustainability of urban mobility, and the integration of these indicators in a composite index. Secondly, the data availability is analysed and solutions for currently lacking data are proposed. Thirdly, the selected indicators are linked to an integrated policy evaluation framework, containing tools such as an external cost calculator, social cost-benefit analysis and multi-actor multi criteria analysis. In this way, a better monitoring of the long-term shift towards sustainable urban freight movements is envisioned. Currently, an urban mobility policy evaluation framework is being developed for the Flanders region, in order to assess the impact of mobility and logistics measures on urban sustainability. An important element in this framework is the development of an index based on easily measurable and manageable indicators. The goal of this paper is twofold. First, the paper will describe the setup of such an index, taking into account data availability for the individual indicators. Secondly, the paper will investigate how these indicators can be linked to the additional tools for decision aiding that are incorporated in the policy evaluation framework, such as external cost calculation, social cost-benefit analysis and multi-actor multi-criteria analysis. Indices or composite indicators are increasingly acknowledged as a useful tool in policy analysis and public communication (Bax et al., 2012; Hermans, 2009; Singh et al., 2009). To a large extent, they have become the focus in the field of environmental systems analysis (Zhou et al., 2006). The Compendium of Sustainable Development Indicator Initiatives mentions over six hundred efforts to create sustainability indicators. Parris and Kates (2003) refer in this respect to the concept of “indicator industry”. Nevertheless, a review of 36 sustainability evaluation frameworks demonstrates the gap in indicators that are able to adequately assess freight mobility. Of all studies investigated, that differ considerably in publication year, scope and procedure, 22 frameworks include indicators on freight. Nevertheless, as passenger mobility is excluded to a lesser extent, only two studies contain indicators that are explicitly addressing logistics activities. The aim of this research is to define a set of core indicators for this specific application that is well capable to be added to the already existing indicators that are relevant for sustainability assessments at the local level. The Handbook on Constructing Composite Indicators (2005) states that indices are highly competent to illustrate complex and elusive issues in wide-ranging fields, such as environment, economy and society. Given their ability to summarise, focus and condense complex phenomena into meaningful units of information, indices are ideal tools for assessing multidimensional concepts, such as sustainability (Li et al., 2012; Singh et al., 2009). For policy-makers, indices present a number of advantages. An index is a competent communication tool for addressing stakeholders and stimulating public interest, awareness and discussion (Li et al., 2012; Gilbert et al., 2002; Saisana, & Tarantola, 2002).
The City Logistics problem arises from the tension between the strategic behaviour of the private agents retailers, suppliers and logistics service providers), each independently optimising their logistics operations, and the social optimum pursued by the city planner. In the current paper we consider a limited urban area populated with $n$ retailers, for instance the stores in a shopping mall or on a commercial street. Each shop independently optimise its logistics operations to minimise its transportation and inventory costs, and many of these stores might be organised as parts of bigger retail chains consolidating deliveries from different suppliers in a cost-efficient manner. However, from a city perspective such system of independent agents can still be unsustainable, generating inefficiencies and externalities to other retailers and to the society. This is due to (1) the lack of economies of scale since many retailers are not big enough and therefore underutilising goods vehicles, making frequent under-loaded and empty trips; (2) the fact that retail chains optimise their deliveries from an "origin-perspective", while a "destination-perspective" is optimal for the city as a whole, hence contributing to traffic congestion in the urban centre, creating queues at the loading/unloading bays and parking lots, generating air and noise pollution. A well known policy dealing with the city logistics problem is the construction of an Urban Consolidation Centre (UCC), a shared transshipment platform where several suppliers deliver freight and from which consolidated deliveries take place. In the current work we focus of a single-site UCC with one landlord (as defined in Allen et.al, 2007), where all the retailers served by an UCC are located in the same point of a logistics network. Although the UCC scheme has been implemented in several cities around the world, the literature reports mixed results on their performance and sustainability, concluding that the UCC is not a "one-size-fit-all" solution to the logistics problem. Moreover, although several papers provided important guidelines for city planners on how to implement an UCC scheme, we have encountered the following gaps in the literature:1) most of the case studies provide only a qualitative analysis on the UCC scheme.2) of the studies that provide a quantitative ex-ante evaluation framework for an UCC, many has focused on the environmental benefit of the scheme, while few works have discussed the problem of the financial sustainability of the policy. In the next section we summarise some of the guidelines provided by the UCC literature. The aim of the current work is to explore in a quantitative manner the problem of financial sustainability of the UCC scheme. In order to do so, we focus on the economic impact of the UCC scheme on each single agent, modelling their decision making behaviour when facing the choice between joining or not the consolidation centre. We argue that such decision has two main components:1) a strategic component in which a retailer's decision of joining the UCC depends on the other firms' decision as well. We provide a simple game theoretic model to find the conditions such that joining the UCC is a dominant strategy.2) an economic component where a firm's decision in joining the UCC is based on a cost/benefit analysis, namely an agent will join the scheme if the benefits it receives are greater than its costs. We argue that the logistics costs of a firm depend on its structure (number of branches, location of the branches, number of trucks owned) and on the demands faced at the location covered by the UCC.

In general, there is a need for further research in order to provide city planners with better tools to implement UCC schemes to tackle the urban logistics problem. Further, there is a need to study the impact of the UCC scheme not only from an environmental point of view, but also its economics impact on each single agent and on the overall logistics system. From several case studies, researchers and practitioners have drawn general guidelines on the implementation of an UCC scheme. Ville et.al (2012) describes the case of Vicenza (Italy), where the city planner gave the monopoly of the whole urban freight distribution to the consolidation centre, making de facto freight distribution a public service.

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ID 45: A methodological proposal for develop a decision support system, as a tool to facilitate the coordination among stakeholders in the city of Bogota - Colombia

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The aim of this paper is present the methodology that allows to characterize and design a decision support system. Given that these systems have been developed to assist and support a strategic decision manager. This paper presents the structuring of the proposal taking as its starting point the investigation of "Diagnosis and Formulation of Alternative Management for Logistics Operations at Loading and Unloading of Goods in 10 areas of Bogotá", developed by the National University of Colombia. According to data from research a system that allows the articulation of different stakeholders in the processes of distribution in the city is proposed as address the shortcomings found in the investigation that these stakeholders have to face when operations are performed loading and unloading of goods. That is why the assessment given the very different dynamics found in the 10 areas assessed in the study considers a decision support system as a robust tool to adapt to the different dynamics of each area. Complementing the methodological proposal for the development of the system of decision support certain information, perspectives and preliminary conclusions of the implementation and development of the proposal, as well as a group of research perspectives in this field are presented according to the study was conducted to choose the option of decision support system. In the first part present the description of the research that served as a basis for the conception and formulation of the methodological proposal in this description will be make emphasis on the background of the study and the type of information founded, which served to highlight the needs dormant for stakeholders in the operations of loading and unloading. In a second instance will be entered to define concepts and approaches that allow to structure the basis for developing a decision support system idea. Exposing the review of literature carried out and supporting this, the benefits and uses of these systems in different cities around the world will be exposed, looking to have an approximation to the dynamics proposed by the areas of the city of Bogotá, or sustaining the use of this tool transversely looking for coordinating follow the stakeholders involved in logistical operations. Entering the central axis of the paper are the proposed methodology for the development propose, based on the current situation and the desired situation which is expected to reach through the development of decision support system. In this case, the advantages of developing the system with the regulator and the challenges for acceptance by stakeholders involved in the daily logistical operations within the city. As finding is presented as research results after some estimates data system development, this as desired situation, perspectives and development and implementation of the system challenges, and description of some latent gaps in research for the application of tools such as systems, decision support, looking to be media coordinators stakeholders and control bodies amid logistical operations that take place in a city. And finally some recommendations to consider in accordance with the findings in the study and review of the literature.

- Coordination of stakeholders to mitigate the effects of operations, had a positive impact on the decrease of the effects associated with the operations of loading and unloading of goods.
- The development of the tool must be coordinated with the technological platform that has the body of government control as she is concerned the issue.
- The acceptance of a technological system is slow due to resistance from stakeholders to implement information technologies in their operations.

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This paper makes a proposition of a framework to develop a logistic planning for urban freight to Belo Horizonte city. It will consider the involvement and cooperation of the three mainly agents, the city transit and transportation public agency - BHTRANS, the logistic operators - SETCEMG and retailers representatives - CDL. This process aims to develop a collaborative approach and understand how they integrate different point of views, city needs and objectives to common goals. This collaborative work aims to improve quality of life, less air pollutant emissions and noise emissions, reduce traffic congestion, accident – related injuries, social costs and fatalities. To achieve these goals, it will be proposed some packages of measures extracted from previous and current European research projects, mainly Turblog , Bestufs and Bestufs II. The important characteristic of this framework is that it will be aligned with Belo Horizonte’s Urban Mobility Plan and will be considered some fields of action educational, infrastructural, operational, regulations, economical, land use planning, technological and cooperative areas. This model will be also, compared with the logistic strategic plan for the City of London. The result of this work intends to be a guideline for the next Bhtrans Urban Logistic Strategic Plan for the City of Belo Horizonte, now in design and construction process. The urban logistics, sustainable traffic and transit solutions and its effects in the urban mobility is, nowadays, an important issue to the Major of Belo Horizonte City. BHTRANS, the public transit and transportations agency of Belo Horizonte is developing a Strategic Urban Logistic Plan. However, according the functional structure of city major, urban regulations and infrastructure are not under the control of the BHTRANS management system and aligned with the metropolitan director of integrate development planning. The necessity of a systemic overview of all the urban logistics aspects by the other functional agents and political agents of the City Major is considered critical to motivate innovative solutions and to permit to establish clear drivers for the future of the city logistics. According European researches, mainly in the TURBLOG, became clear the necessity of considering the package of measures to have a systemic approach. Some strategic lines are necessary for concise strategy’s formulation (Ruesh,2012):

- To secure and increase efficiency, lower costs and quality of the goods supply
- To improve the accessibility of freight transport intensive land use, including establishment of land use premises.
- To minimize the negative impact of freight transport.
- To reduce the conflicts with passenger and pedestrian transport, including bicycle.
- To support and encourage the awareness for freight/logistics issues, education and innovation.
- To improve cooperation.

In according these lines, BESTUFS also had been investigated some fields and associated measures like the table.

The case of London is specially interesting because it was formatted a freight unit in Transport of London (Browne et al., 2012), the executive body of the Major. It was developed and has been implemented a business plan that contains seven aims in three fields. ECONOMY field – Support London’s growth in population and economic activity; improve the efficiency of freight distribution and servicing within London; balance the needs of freight and servicing with those of other transport users and demands for London’s resources.
Brazil's freight modal split is mainly focused on road transport. In the state of Rio Grande do Sul, one of the most populous states of Brazil, 85.3% of the total cargo is transported by road. The former value is above the Brazilian mean of 68.6% transported by road (SECRETARIA DA COORDENAÇÃO E PLANEJAMENTO, 2015). The imbalance between different transport modes suggests a need to promote alternative modalities to strengthen the competitiveness and provide a more sustainable economic development. Planning for a more efficient and sustainable transport system within the state is being carried out through studies that seek to promote the rationalization of transport flows among different modes, encouraging multimodality. The final aim is to increase competitiveness in logistics of Rio Grande do Sul that allows better access to domestic and international markets. Increasing the efficiency of transport systems to improve the competitiveness of a region needs the formulation of appropriate transport policies which can be found when knowing supply chain actors’ preferences about different attributes of available transport modalities. In this regard, assessing firms’ value of service for freight transport in different modes is important for policy makers, public agencies, local governments and researchers (Daniels y Marcucci, 2007). The goal of this paper is to identify logistics managers’ preferences for freight transport service attributes for the case of Rio Grande do Sul in Brazil, and discuss which transport policies could encourage multimodality and more sustainable uses of available transport infrastructure. In this paper a stated preference (SP) technique for collecting data on respondents’ choices among hypothetical options is described and then standard econometric discrete choice models are used to estimate a model that allow us to identify the preferences and discuss some possible sustainable policies that could increase the competitiveness of the region. Personal interviews were conducted between January and March 2015. 50 shippers and logistics managers from Rio Grande do Sul were interviewed. The selection of shippers considered the diversity of production chains, type of cargo to be carried, transport volumes, economic value of the cargo and final destination of the cargo (state, national or international). Previous information about the shippers for selection was obtained from two sources: (i) Analysis System of International Trade Information- ALICE (Ministério do Desenvolvimento, Indústria e Comercio Exterior, 2014); and (ii) Business Ranking - Índice Empresarial Grandes (Amanhã, 2014). The type of products transported within Rio Grande do Sul and selected to be included in this study were those with high density of transport, which represent at least 80% of all products generated in the State and considered the most representative in the commercial balance of the State, and those with low added value but with a strategic importance for the state economy. 22 products were selected, being the most important: footwear, soybeans, tobacco, vehicles, frozen meat, chemicals and leather. A set of 18 choice situations were presented to each interviewee. During the stated preference experiments logistics managers were asked to point out their favorite transport option between 3 alternatives available: (i) Road, (ii) Intermodal considering rail, (iii) Intermodal considering inland waterway transport. Each alternative was described by four attributes: Total transport cost, Total transport time, On-time delivery percentage and Percentage of deliveries delayed more than 2 days. Each attribute was specified with 3 levels. Attribute levels to be presented to each interviewee were customized for some groups of cargo from origin and destination information available in a previous study (Rumos, 2015; 2006) and information obtained from Brazil's transport network, through analysis of spatial data and spatial analysis performed in Transcad (Caliper, 2012). The experimental design was structured using a Efficient design (Rose and Bliemer, 2009) and implemented in NGene (Choice Metrics, 2013).
The transportation of potentially harmful products has attracted the attention of scientists, authorities and general public from a long time ago. However, recent events, such as the urban densification and homeland security threats have brought this topic to a new level of awareness imposing an urgent pressure over all the relevant actors to guarantee a safe and fair transportation of these products while at the same time keeping it cost at a minimum. The topic of hazardous materials (HAZMAT) routing has been extensively treated in the specialized literature; however, the main focus has been the transportation of one type of merchandise from an origin to a destination through an optimal route. The latter approach produces a socially beneficial solution only when a single shipment is to be sent. However, if the optimal route were used on a periodical basis, people living in the surrounding areas become more exposed to the risks than the rest of the population, even though the total social risk may be at a minimum level. Then, the issue of social justice or equity on the risks bore by different segments of the population become an important part of the routing problem, as a new restriction: to guarantee that none of the population segments are exposed to a risk higher than a given threshold. The problem becomes more complex as more than one HAZMAT is being transported on a network because different products impose different risks on the population and the total risk will be a compounded effect. Thus, the problem to be solved in this article is that of finding a set of routes in a transportation network, that allow the movement of several types of HAZMAT on a regular periodic basis, without exposing any part of the population to a risk level higher than a predefined threshold. The main safety concerns for HAZMAT transportation are accidents that cause multiple fatalities. That scenario typically occurs when a vehicle transporting HAZMAT, gets involved in an accident spilling out its material over densely populated areas. Accordingly, one of the main goals in the route choice process is to reduce the probability of an accident with fatalities. However, this is not the only objective to pursue, especially when multiple shipments of different HAZMAT take place over a highly populated area. In this context, parts of the population might be exposed to a variety of risks depending on the properties of the HAZMAT to be transported. Therefore, reducing the total risk as well as the consequence after an accident seems to be more appropriate. Even though risk is accepted as a central issue in HAZMAT transportation, there is no agreement between researchers on how to incorporate it into a modeling framework. However, researchers agree on the close relationship between risk and probability and consequence associated to an undesirable event. Even though there are a high number of undesirable consequences (such as environmental damage, economic losses or injuries), many risk assessment methods focus on fatalities due to a HAZMAT release. Certainly, the latter approach simplifies the risk assessment process but its final result could be far from the actual consequences inherent to a potentially dangerous activity. Moreover, the sole valuation of risk as a number of fatalities due to an incident is extremely difficult to assess in most practical cases due to the fact that the direct and indirect impacts of a HAZMAT release is not well known and most of the time, dependent on unknown conditions. Fortunately, for many strategic decisions related to HAZMAT management, a comparison of relative risk choices is more adequate than the absolute risk quantification. Hence, the concept of risk is understood here as the relative magnitude of the potential damage that a HAZMAT may cause (rather than its absolute value).
Research in urban freight transport has explored a range of solutions to improve the sustainability of the sector. Urban distribution centers might be one of the most investigated concept in the field. It was often implemented by authorities in order to reduce congestion and improve air quality in the city. A logistics urban platform located close to the city allows to consolidate the goods coming from different suppliers with a common destination. This way, the capacity of the freight vehicles driving in the urban areas is more efficiently used which reduces the need of freight vehicles in the city. Besides, such a platform allows to introduce other sustainable solutions such as environmentally friendly vehicles, night distribution or intermodal transport. As a result, the European commission is calling for a wider implementation of such platforms in their white paper on transport (EC, 2011). They advocate for a more efficient interface between long distance and last mile freight transport. The Region of Brussels-Capital is planning since its first transport plan in 1998 to introduce an urban distribution center. The local authorities tried to implement one in 2008 but the project failed. The authorities made the mistake of conducting the project in a top-down approach. However, Woodburn et al. (2005) had already identified the importance of involving stakeholders in the first stages of the implementation of an urban distribution centre. The top-down approach resulted in a strong opposition of the citizens and the project was postponed by the authorities. In 2013, the local authorities renewed their willingness to implement an urban distribution center in the strategic plan dedicated to freight transport (Bruxelles mobilité, 2013). In that context, the Region is supporting a research project that develops different scenarios to improve the sustainability of freight transport in Brussels based on one or several distribution centres. Given the previous experience, the attention of the project is focused on the opinions of the stakeholders. The goal is finally to identify the scenario that receives the best support from the different stakeholders. The scenarios that have been developed for the Brussels-Capital Region are considering the number of urban consolidation center, their optimal locations and the type of measures to support the scheme. As a result, authorities have to make a decision between the four following options: 1. Keep with the current situation. That is the business as usual scenario to assess the current situation in order to compare it with the other scenarios 2. A scenario with a major urban distribution center. We introduce also in that scenario the toll on heavy goods vehicles that is planned for 2016 in Belgium. It foresees a kilometer tax doubled within the main roads of Brussels and tripled on the municipality streets in Brussels.3. A scenario with two urban distribution centers, one in the north and one in the south. No toll is proposed in that scenario but night transshipment are possible at the urban distribution centers. 4. A scenario with four urban distribution centers, spread at the different corners of the city. A toll is in that scenario again enforced but it is applied on every freight vehicle, vans included. It also considers the environmentally friendliness of the vehicles. As a result, the vehicles operated by the UCC are only electric or bicycles. Finally, night distribution is possible to the UCC. In order to include the stakeholders in the decision process, we use the multi-actor multi-criteria analysis (MAMCA). That methodology uses the objectives of the different stakeholders as evaluation criteria for the scenarios. This way, the opinions of the stakeholders are at the core of the methodology.
Urban logistics attempts to increase the efficiency of goods distribution in urban areas while the negatives externalities are mitigated. However, the recent trends in e-commerce pose new challenges to the field of research. Home addresses still being the preferred point of delivery for e-commerce shopping (Copenhagen Economics, 2013), this preference comes with two drawbacks, (i) the customer has to receive the package by some mean, and (ii) if the product has to be returned the customer must coordinate the collection time and location. From an urban logistics perspective those two drawbacks are causing less efficient transport and more transport, on the one hand more trips are forced by failed attempts to deliver and on the other hand more trips are there to collect refunded items. Logistics companies are looking for different solutions to overcome the drawbacks discussed above. One is a time windows agreement between the receiver and the carrier, which reduces the number of failed delivery attempts, which it usually creates a “Ping-Pong” effect in the routing of the delivery (Gevaers, 2013). Many papers has been devoted to the analysis of the outcomes of delivering at a different location in particular in pick up locations (see Dell’Amico & Hadjidimitriou, 2012, Quak, Balm, & Posthumus, 2014, Gonzalez-Feliu, Salanova Grau, & Beziat, 2014; Morganti, Dablanc, & Fortin, 2014; Morganti, Seidel, Blanquart, Dablanc, & Lenz, 2014, for some references). While this solution also reduces the number of failed attempts and usually the travel distance, there exist a few points to remark: (i) to receive products in a different location may discourage e-customers from buying online, (ii) considerations in terms of security and ownership need to be considered but are still missing, (iii) the refunds problem is not always solved. The goal of this paper is to analyse the results of a trial in the city of Mechelen of an innovative solution for e-commerce deliveries: ParcelHome, by installing an automated locker at the home of voluntary customers, who will be able to receive e-commerce products, without the need of moving to a different location or being at home at the time of the delivery. With the analysis we seek to provide an evaluation of the private distribution costs for carriers and customers, and keeping an urban logistics perspective, we take account for the social costs in terms of emissions and congestion. This paper also challenges a solely cost perspective, by considering the variation in the e-shopping behaviour associated to the use of the home locker. To achieve this purpose, we will develop a three-step exploratory and analytic methodology based in quantitative and qualitative variables. In the first step, a cost function will be developed in order to account for private and social costs associated to the distribution of e-commerce parcels. The cost function is inspired by previous research contributions in last mile deliveries costs (Gevaers, Van de Voorde, & Vanelslander, 2014), but improved by adding the cost drivers of social costs for municipality as well particular characteristics of the e-commerce distribution in the city environment. In the second step, two baselines will be constructed, one from the demand side by using survey methods to assess the current e-commerce behaviours of the customers involved, and one from logistics carriers, where data will be gathered to feed the cost function and develop a cost baseline for the logistics supply side. These two baselines will become an important contribution to provide insights in the current state of e-commerce adoption and urban logistics costs originated from the e-commerce business model. Finally, as third step, data will be gathered during a four-month trial in the city of Mechelen. Around 100 ParcelHome automated lockers will be installed with voluntary customers to receive e-commerce parcels. The trial will be also coordinated with the main logistics carrier operating in the city and with the municipality. With this data we will be able to assess the impacts on the urban logistics from the proposed solution. Insights on types of goods, volume, shopping and delivery behaviours and reverse flows also will be analysed. The expected results from this evaluation will shed light on the benefits of the use of ParcelHome automated parcel boxes in customer’s houses. Within this results we will provide a cost calculation tool to contrast the with baseline costs.
This paper analyzes the behavior of freight trucks in the Tokyo metropolitan area by analyzing the probe data obtained from the recent goods movement survey in the Tokyo Metropolitan Area conducted by the national government. With a variety of probe data the survey would have a large potential of analyzing detailed route choice behavior of commercial/freight trucks in the entire metropolitan region from various aspects. The exact understanding of track behavior is quite important for mitigating congestion. In the Tokyo metropolitan area, traffic congestion occurs very often in the same manner as other urban areas. It is generally regarded that one of the main reasons of traffic congestion in Tokyo would be the fact that about 60% of traffic including trucks in the inner-city area is “through traffic” because the expected functions of the ring roads have not yet been fully revealed. Particularly, the outer one of the planned three toll ring expressways (“Ken-O express highway”) has been uncompleted yet. The national government has a plan to finish the construction of most stretches of these three ring expressways by 2020. With the completed ring expressways, the number of inner-city congestion will be expected to decrease significantly. We are fairly certain that understanding the behavior of freight trucks would make the policies like congestion pricing more plausible and more feasible. This paper studies three different types of probe data from the fifth goods movement survey in the Tokyo metropolitan area in 2014. The first one is the on-board equipment maker's data that records approximately 22,000 tracks passing through the area including the downtown. This first dataset covers the entire of the metropolitan area but the GPS records are stored every 10 minutes. The second data is the trajectories of some specific freight vehicles provided by the specific carrier companies. The time interval of this data is between 1 to 60 seconds and the companies provide the two weeks probe data of one or two thousand trucks. The third probe data is originally obtained from the approximately 300 trucks in the Tokyo metropolitan area. The national government requested some carrier companies to install probe equipment for their trucks for one week and then the GPS records can be stored every two seconds. With the enormous volume of these probe datasets and the differences in their characteristics, this paper hopefully will analyze the difference of route choice behavior, compares the behavior such as velocity in terms of the delivery time, and considers the characteristics of logistics transportation.
Supplying the population with food is an essential task of the economy. To avoid shortfalls, it is necessary to know where supply disruptions could occur. Having enough transport capacity is one of the main weak spots in the food supply system. To understand the demand for transport capacity it is important to understand how production, sourcing and consumption are changing during a disturbance and how commodity flows are rerouted. A freight transport demand simulation covering the effects of a disturbance and determining the additionally needed transport capacity could therefore be extremely helpful for economic decision makers and the government. It would help making the right decisions to ensure the food supply for the population. In this paper, such a freight transport demand model will be presented.

The research presented in the paper defines a new dynamic model of food supply. The model includes 51 food categories including four different temperature ranges. It differentiates between the different actors in a supply chain: food producers, food retailers, wholesalers, logistics service providers, and the consumer. It works on an aggregate level of 402 regions within Germany as well as the most important trading nations. In the model, inventories for every food category, every group of actors, and every region are recorded in a single data cube. This data cube is recalculated incrementally every day, considering the production, relocation of food products, and consumption. Gravity models calibrated with data of the Federal Transport Plan generate the aggregate commodity flows between the regions. A detailed sectorial input output model for food is estimated for the year 2012 based on data from public authorities, food-related associations, and professional data providers.

It will be shown that it is possible to design a dynamic freight transport demand model that can operate with available data. Planned analysis include the determination of alternatives for food supply considering capacity restrictions of the logistics systems of the different actors, the estimation of demand for transport resources, and the identification of critical time paths during a food supply disruption. These analyses will increase the transparency on the food supply system and its elements making a risk evaluation possible. Thereby, dependencies and vulnerabilities within the food supply system can be uncovered.
Little research has been performed within the field of health care logistics towards and within cities. Other goods flows like retail and e-commerce are investigated more often. There are several reasons for this evolution. First of all, many literature is focussing on new innovations and policies in which the authors investigate the city as an entity. With this approach, the effect on a specific sector is not examined. Examples are innovations review papers concerning road pricing and urban distribution centres. Secondly, health care logistics were left aside because of the high number of constraints and limited interest of policy makers. Nonetheless, the specific goods flows of health care are growing and new challenges emerge for this sector. This specific goods flow has a relatively high impact on city centres and evokes many traffic movements, pollution and noise during peak hours. The limited literature and the choice for the approach to target one specific goods flow in this paper, determines the way the paper is structured. Besides, the health care sector is, within the Flanders region of Belgium, a vulnerable sector in which there is always pressure on non-patient related supply chains. The efficiency of the health care logistics supply chain depends on different variables such as the lead time but also on several handling conditions and regulations. The objective of this paper is twofold: the first objective is to gain more insights in the way health care logistics are structured and organised. Therefore, this paper builds different market typologies. Hereby, the specific characteristics of the goods are one of the main parameters. A second objective is to build a decision matrix based on the developed market typologies. This matrix provides the main stakeholders with a good guideline which market typology is the most appropriate for given goods or a specific situation. In the conclusion, this paper highlights some weak points of the supply chains and tries to list decisive variables which influence the costs of the main stakeholders. In this research, there is special attention for the specific characteristics of health care goods and the expectations and behaviour of the different parties involved. The focus of this paper is on business-to-business goods flows. In particular, the deliveries from producers towards pharmacies but also hospitals and retirement and care villages located in city centres are examined. More specifically, the paper answers the following research questions:
1. How are business-to-business health care logistics structured and organised?
   a. How to define health care logistics?
   b. Which business models are common in the sector?
   c. Which are the specific characteristics of the goods transported?
2. Which market typology fits best for a given type of good?
3. Which are weak points in the supply chain?
4. Which sector specific factors should be kept in mind during further policy formulation?

To come to this final goal, five research steps are performed. In the first step, an extensive problem description is given in which the expectations of the main stakeholders and specific characteristics of health care goods are listed. Originating from this research, some key words and goods categories are defined in the second step. A third step describes observed delivery patterns in cities. The next, fourth, step brings these insights together which result in the development of four different market typologies. These market typologies are the base for the next step in which they are converted into a decision matrix. The development of this decision matrix is the core of this paper. Besides, the paper tries to highlight weak points in the current market organisation and structure. Originating from as well the decision matrix (building process) as the listed weak points, some recommendations to improve the efficiency of delivering health care goods to and within cities are formulated at the end of this paper.

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Cities are involved in major infrastructure decisions. Some of this is directly related to transport - for example building new metro systems or developing major interchanges such as railway stations and air terminals. On the other hand many major urban regeneration schemes are not directly concerned with transport (freight or passenger) and yet it is clear that such projects will have significant implications for transport in terms of both future demand patterns connected to the flows of people and goods and in the opportunity to ensure that freight issues are addressed from the start of a development. However, it is clear that in many cases freight is a minor consideration in these urban infrastructure projects. Recent work we have carried out in London has considered the opportunity to use major investment in railway station capacity to consider whether such redeveloped stations could play a part as urban freight hubs. The result of the research has highlighted that there are indeed some important opportunities. But the research has also shown that freight has not featured strongly in the thinking about the investment nor in the more detailed planning of these new developments. It is important to understand why freight is not considered when major infrastructure initiatives are being devised. If freight is ignored or treated as an afterthought then important opportunities to reduce the impact of freight on the urban environment and to ensure that freight operations can be managed efficiently will be missed. There are a number of possible reasons why freight considerations do not feature strongly in such major infrastructure planning: i) There is limited work to demonstrate the value or importance of freight activity to a city - most work on urban freight considers the negative impact and looks at freight as a cost - this approach means that freight is typically seen as a necessary evil and not really something where there may be economic benefits from significant improvements to urban freight that could be achieved by means of plans to put freight at the heart of thinking about new infrastructure. ii) Understanding of urban freight issues is still missing from the thoughts and plans of many urban policy-makers who shape the developments of the city and is also missing in the framework of companies that are responsible for commercial developments and indeed architects and master planners. This omission of freight means that it is almost always only introduced as an afterthought into the discussion. iii) The governance structure of cities and the way in which planning decisions are made often means that freight considerations can be overlooked. This happens with overlapping governance approaches where the strategic benefits of allocating space to freight may be outweighed by the local reaction that may be against the acceptance of freight activity in a given location. The issues above have been explored in a recent study that has been carried out in London that looked at the potential role of railway stations as urban freight hubs. Between October 2014 and March 2015 we have carried out a research investigation of the potential role of railway stations as urban freight hubs. The research involved an extensive literature review about the scope for rail use in urban freight and the existing and potential use of railway stations as freight hubs. The review was worldwide and involved a survey of freight experts (XX in total). The review was then extended though a series of interviews with key stakeholders from the public and private sector considering the issue at a national level (i.e. within the UK). These interviews then formed the basis for a further more detailed assessment of the potential importance of railway stations as urban freight hubs within London. The context for this research was the recent and planned major development of railway stations in London as a result of initiatives such as High Speed 1 (the line linking London to the Channel Tunnel) and High Speed 2 (the planned development of a high speed line to run north from London and eventually to connect London and Edinburgh).
My objective is to look at how warehousing and logistics activities are integrated into local and regional policies and planning processes. I am taking Los Angeles as an example, as I have had the opportunity to conduct a first survey there in 2011-2012 (Dablanc, 2014) and I plan a second survey during summer 2015 as I will be staying at the University of Southern California for an academic visit at that time.

There has been an important rise in the number of warehouses and distribution centers in the Los Angeles metropolitan area in the past two decades (Dablanc, 2014), as illustrated by Figure 1 in the Appendix below. Global supply chains and new local consumer markets such as e-commerce require more logistics facilities, and the way these facilities are spatially organized has become a key feature in the general evolution of freight mobility and truck traffic in the region.

My question is then: how do local and regional planning practitioners have addressed this “intrusion” of freight transport and logistics activities in their territories? In one of the few academic studies of local planning and freight issues, Cidell (2011: 832), using the Chicago metro area as an example, looks at how local governments react to the development of freight facilities: “New jobs are welcome, but the low per-acre tax revenues and absence of sales taxes associated with this type of development are often resented.” Looking at how municipalities in Northern California cope with distribution centers, Hesse (2002) also notes a reluctance to attract logistics land uses, even though, according to the surveys he conducted there, most cities do not actually discourage goods distribution firms, even cities with a focus on high technology. In Los Angeles, attitudes towards warehousing activities seem very varied, with many local governments being positive towards them, as a way of compensating for the loss of manufacturing jobs, especially during the recession (2009-2012). From my first set of interviews and analyses (2011-2012), I had noted the following behaviors from local governments confronted with logistics developments: i) Trying to prevent logistics growth in traditional manufacturing areas. ii) Looking at logistics as a way to revitalize declining manufacturing areas. iii) Looking at logistics as a strategic sector for accelerated local economic growth. iv) Looking past logistics, diversifying industrial developments.

At the regional level, what is striking is that there is no regional coordination on issues of warehouses and logistics sprawl. Land use and building permit decisions are made strictly at the local level (cities and counties). Each government competes with, or criticizes, the other’s strategies. This results in a deficit of attention to regional consequences of decisions regarding logistics sites. Scarc public resources are dispersed in local or redundant projects, such as highway interchanges. I plan to proceed in the following way.

1) Update the analysis of warehousing developments in the L.A. area made in 2011-2012 (Dablanc, 2014). This includes: 1) Include data from 2009-2014, using the NAICS 493 from the County Business Patterns. 2) Use recent research results from Woudsma et al. (2015) to clean up the data and eliminate “fake” warehouses, especially self-storage.

2) Implement a series of interviews with local and regional planners and persons of interest. Interviewees will be selected from the typology already defined in Dablanc (2014) from the first set of interviews and analyses in the Los Angeles area in 2011-2012.

Results expected are 1) An update of past research on logistics sprawl indicators for the L.A. area. 2) A better understanding of local governments’ attitudes towards freight issues. And 3) An original typology of local governments based on the nature and level of their interest in and involvement about freight facilities and activities. Conclusions will be targeted at providing some recommendations. Recommendations will be around the following: how can a more efficient freight and logistics regional planning be implemented? The public and private sectors both need to optimize warehouse locations and distribution networks and improve transportation system performance. Explicit consideration must be given to environmental impacts and quality-of-life concerns. Freight and logistics planning must become a more usual part of planning. At the local level, better freight facility management includes proper warehouse siting and accessibility, adequate infrastructure and the consideration of construction, operation and maintenance costs.

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Although the store shopping remains the predominant way to buy, internet is modifying the end consumer’s behaviour. In fact, the advancement of information and communication technologies have pushed more and more people to choose to shop on-line. This is more evident, for example, by the fact that by 2020 up to one third of the total shops at shopping centres in countries like the Netherlands will be closed down due to the economic crisis and competition from web shops (Javelin Group, 2011; Visser et al., 2014).

This new shopping trend can have impact on freight traffic in urban areas because products purchased have to be delivered to customer at homes through delivery tours that cannot always be optimised and cause growth of traffic impacts (Duranda and Gonzalez-Feliu, 2012). Besides, additional costs for repeated deliveries can occur. In fact, attended home deliveries require customers and logistics service providers to agree on a service time window in order to avoid failure of delivery. For logistics service providers, accepting more deliveries can yield more revenues, but it can make it harder to reliably make deliveries within the service time windows. From a consumer’s point of view, online retail is associated with a number of benefits such as greater product choice, the ability to obtain goods not sold locally, better price comparison, etc. From a logistics point of view, however, the solution for delivery is very demanding. Efficient and reliable logistics are a key factor for the economic success of on-line shops, and shipping costs are one of the biggest concerns for online customers. Especially the “not-at-home problem” has to be treated, which results from the delivery of goods requiring the presence of the customer. This leads to complex planning problems within the last leg in supply chains, i.e., the last mile to the consumer. Therefore, although home deliveries are usually preferred by on-line shoppers (Morganti et al., 2014a), from a planning point of view, there is a rising interest in developing alternatives that satisfy both consumer demand and transport operators to optimize parcel distribution through consolidated shipments. In Europe, pick-up points (i.e. stores providing parcel drop-off and pick up services) are fast-growing solutions. The largest pick-up point network is the Packstation network operated by DHL/Deutsche Post in Germany (2500 locations around the country; Morganti et al., 2014b). According that in the next future the e-purchases will increase and the impacts due to home deliveries could raise, the paper investigates the opportunity to delivery to pick-up points located within the urban area. In particular, a methodology that can be used to design a pick-up system in downtown and to give a sustainable solution for improving urban environments is presented. The methodology is supported by a new demand modelling system that allows to point out the e-shopping demand and that has been obtained through the investigation of factors that drive end consumers in their purchase choices. Previous research on delivery movements for e-commerce has mostly focused on describing and modeling household shopping trips (Ehmke and Mattfelda, 2012; Gonzalez-Feliu et al., 2012; Ehmke and Campbell, 2014; Nuzzolo and Comi, 2014a), but few of them have investigated the impacts of home deliveries on city sustainability and assessed alternative solutions, such as pick-up point network. They are points where customer comes to pick up his/her goods after notification of arrival. Such a delivery offers several advantages, such as goods is centrally delivered and can be consolidated. Delivery can be at any time of the day. Also for picking up there is usually a large time window, if not 24 hours. Therefore, the issues due to non-attendance of customer at home can be solved.

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Urban goods flows are mainly made of three components related to shopping and restocking:

- **shopping** mobility; it concerns the end-consumer shopping trips (passenger flows);
- **shop restocking** mobility; it refers to the goods trips performed in order to restock shops (truck flows for shop restocking) in which the goods required by end consumers is sold;
- **e-purchase delivering** mobility; it denotes the goods trips performed in order to delivery e-purchases to end consumers or to pick-up points (truck flows for e-purchase delivering).

End consumers usually buy at a shop and hence their shopping choices influences the restocking flows. Therefore, shopping demand represents the input of restocking, and subsequently, modifications occurring on shopping have indubitably effects on restocking. Besides, the penetration of Information and Communication Technologies into human life has influenced personal activities and also the related travel. In fact, among the several activities that can be performed without travelling, shopping is one of these. On-line shopping has been increased dramatically during the last decade. In Italy, the total e-shopping sales is yearly increasing of about 18% (Osservatori, 2013) and in the USA in the last year it has increased of about 16% (Census, 2015). As suggested by Mokhtarian (2004), the potential impacts of on-line shopping include changes in volume of goods purchased, changes in per capita consumption spending. Additionally, it creates goods delivering trips to residential areas, and influences end consumers’ trips. The expected benefits of e-shopping on passenger transportation demand is the reduction of related trips. At the other hand, this change can have goods distribution impacts. First of all, the supply chain structures have to modify in order to include this segment of demand. The purchased products have to be delivered to end consumers at home, and the result can be the increasing of veh-kms of commercial vehicles due to the parcelling of deliveries and the possible missing deliveries (e.g. about the 12% of deliveries have to be delivered a second time, Visser et al., 2014). End-consumer choices in relation to type of retail outlet (e.g. small, medium or large) undoubtedly impact on goods distribution flows: the characteristics of shop restocking process are strictly related to the type of retail activities to be restocked in terms of delivery size, delivery frequency, goods vehicle type and so on. For example, delivery size, goods vehicle dimension, shopping car use and trip length tend to increase with the dimension of retail activities, while delivery and shopping frequencies tend to decrease, with considerable effect on the total distance travelled by goods and passenger vehicles. Furthermore, end-consumer shopping location choices depend on the location of commercial supply with respect to residence and on end-consumer behaviour, which in turn depends on some characteristics such as age, income, family dimension and lifestyle. Further, end-consumer choices of type of shopping (in-store and on-line) and retail type can also depend on the accessibility of shopping areas; thus if accessibility changes (for example, as a consequence of shopping demand travel management), shares of buying in-store or on-line, type of shop and/or transport mode can also change. Then, if the characteristics of end consumers, residential and commercial land-use distribution, and/or accessibility to the commercial area change, shop restocking and e-purchase delivering characteristics may also do. Similarly, some city logistics measures can reduce the restocking accessibility of an area and induce re-allocation of retail businesses.
Increasing freight delivery in urban areas is a major contribution to traffic congestion, and congestion affects the timeliness and reliability of freight delivery. At same time citizens moving in urban area are also contributors to congestion and suffers traffic delays in their movements. Moreover, authors believe that nowadays e-commerce with door to door delivery to customers’ home, of goods bought on the internet, has increased urban area presence of express couriers vehicles. The consequence is that e-commerce call for multiple 3PLs, trying to satisfy strictly SLA and with reduced time windows, moving across the urban areas, with almost empty carriers, often double-parking and obstructing private cars and public transportation (Fatnassi et al., 2014). At same time, citizens continue to move with their own cars for shopping in the city where public transportation are not well suited for supporting such needs. In fact, nowadays e-commerce logistic deliveries are based on the integration of private and closed distribution networks. The resulting systems suffer inefficiency and unsustainability symptoms such as lack of distribution centres, plurality of 3PL carriers using a lot of vehicles, travelling under-using their capacities (Naccache et al., 2014). So, while B2C is receiving an increasing popularity by the citizens, at same time it is also a source of congestion and pollution increasing CO2 footprint. Improving the sustainability of city logistics requires the deployment of solutions that addresses the three big challenges: social, environmental and economic. Such challenges are considered in the base statement of the Physical Internet Initiative (Montreil, 2013). Physical Internet consider getting products in and out of cities is a nightmare, in fact most cities are not designed and equipped for easing freight transportation, handling and storage, making the feeding of businesses and users in cities a big problem. Therefore one of the main point the initiative try to address is solving and reorganizing the supply chain network using modular containers (Montreil, 2013). The urban logistics is the last link in the supply chain and involves the major number of stakeholders: the carriers, the citizens, the public administration, public transport operators, retailers, etc. It is a small part in the total distance covered by the products along the supply chain, nonetheless it can represent up to 28% of the total transportation cost. At same time it may induce between 16% and 50% of the overall air pollution, caused by transport activities in a city area. Solutions to urban congestion and pollution is usually based on a try-and-see method, which results are evaluated only ex-post (Faure et al., 2014). Feedback and actions, consequences of the ex-post evaluation are often too slow regarding the processes they are intended to address. One option to address this problem has been based on integration of personal rapid transit and freight rapid transit in urban areas (Won et al., 2006). Summarizing, many ideas for optimizing the logistics in urban areas fall in two possible categories. One is the development and optimization of the existing transportation modes and service level. The other is to build innovative logistics initiative, aiming at collaboration between participants in logistics processes and interoperability between different logistic networks. The objective of this work, then, is to consider which methodologies and procedures may be applied, to urban logistics, in order to harmonize freight delivery and people mobility. The intention of the authors is to provide a clear view of the principles that should be adopted for aiming at optimizing efficiency and sustainability of the urban mobility. The first concept we considered, is the reorganization of logistics networks inside the cities. Physical Internet (PI) call for structured networks, changing from an hub and spoke approach, with few distribution centers and many connections between them, to a network systems based on multiple nodes, interconnected with multimodal links, which is identified as mobility web. Nodes and links redundancy, coupled with multimodal options for carrying the goods, allows for spreading of delivery on multiple links, decreasing congestions. However, in order to avoid increasing in number of vehicles, travelling almost empty (average 40%) further hypothesis are needed. There is the necessity for using modular containers (ττ-containers), another base idea of the PI. All the objects that have to be delivered have to be encapsulated in standardized containers easy to handle, store, transport, interlock, load and unload.
In this work the authors describe the activities executed during the Modulushca project, for defining a common set of data and information, to be used in handling modular units in a structured logistic network. The inspiring principles for defining the data model has been the Canonical Data Model, an Enterprise Applications Integrations pattern and the e-Freight management of data exchange. The idea is to have a common and shared format which to translate to and from the messages to be exchanged between the participants. Moreover, the authors defined roles and access rights for the participants to the modular logistics scenario. This work covers the issues related to data exchange in order to enable ICT interoperability in the entire supply chain logistics exploiting modular containers. The M-Boxes and the data model are a possible contribution to the definition of an approach for achieving the Physical Internet (Montreil 2013, Montreil et al., 2014). The focus here will be at the operational level, of the logistics, i.e. the handling of the boxes, the shipments/consignments, the related processes and the information needed. Physical Internet consider getting products in and out of cities is a nightmare, in fact most cities are not designed and equipped for easing freight transportation, handling and storage, making the feeding of businesses and users in cities a big problem. Therefore one of the main point the initiative try to address is solving and reorganizing the supply chain network using modular containers (Montreil, 2013). The urban logistics is the last link in the supply chain and involves the major number of stakeholders: the carriers, the citizens, the public administration, public transport operators, retailers, etc. The proposed data model focuses on supporting the IT protocols for handling modular containers movements from source-to-sink, considering the handling of the M-Boxes in the operations of pick-up and drop-off and the reverse logistic for the empty boxes delivered within a business process, using a structured network, with a common carrier approach across multimodal logistics domains. Regarding the handling of modular units, their internal contents and the stacking/order arrangement, we use a black-box approach, considering as driving model the encapsulation principle defined in the physical internet. The encapsulation principle is inspired to the digital internet handling of the information, the internet does not transmit data: simply transmits packets. The information inside the packet is not used during transmission, it is handled by original sender and final receiver of the packets only and are the “payload” of the packet. Packets are routed, through the digital internet, using only the header information. The Physical Internet encapsulates physical objects in physical packets. Similarly to the digital internet, handling of the M-Boxes is realized using the associated data model, which constitutes the “header” of the physical packets. In our proposed approach we aim at only considering nominal declaration of good’s type and nature, i.e. the information needed for handling the M-boxes are available, without the need to open them. This approach may be used for addressing an organized and collaborative approach, supported by IT systems, for aiming to a more efficient urban logistics. Physical Internet Initiative Internet (Montreil 2013, Montreil et al., 2014) is a major supply chain project that has the potential of changing the way we handle, store, package and transport goods across the supply chain. Basically the researchers involved in the PI wondered whether supply chain professionals could use the Internet as a metaphor for a new way to move physical objects through the supply chain (Montreil 2011). In the same way of the seven-layer Open Systems Interconnection model of the Digital Internet, Montreuil (et al., 2012) proposes an Open Logistics Interconnection (OLI) model to structure the interconnected logistics services for easing the conceptualization, the implementation and the deployment of the Physical Internet. The first project to be considered is Modulushca, related to the Physical Internet initiative and aimed at enabling interconnected logistics, using modular container (M-Boxes), digital interconnectivity of systems with modular container. The final goal is to provide a basis for an interconnected logistics system for 2030. The key enabler is the development & use of modular logistics units of sizes adequate for real modal and co-modal flows of fast-moving consumer goods (FMCG). This paper is based on the activities the authors performed in the project.
There is no doubt that goods transport continues to play a vital role in today's society, in spite of the advances made with new information and communications technologies. The last mile, required to deliver the goods to the receivers, will continue to be an important part of urban dynamics because the distribution vehicles have to circulate on the road network. This proliferation of commercial vehicles in urban centers, sometimes operating under size and weight restrictions, causes a considerable increase in the overall number of circulating vehicles. This results in major world cities being characterized by high levels of congestion on their streets which is normally accompanied by high levels of atmospheric and noise pollution. The policy-makers responsible for urban goods distribution must therefore find solutions which allow the smooth flow of goods to their destinations without prejudicing the functioning of the rest of the city. This can only be done by taking into account the opinions of the stakeholders implicated in urban logistics when defining the policies, as they are the main actors in the last mile, and without their agreement it would be impossible to successfully adopt any urban distribution policy. The main objective of this research is to analyze the behavior of goods receivers in two Spanish cities when they are confronted with the possibility of adopting new goods distribution policies. The analysis has addressed a subject which has received little attention in the scientific literature; most research has concentrated on analyzing practical cases or the economic or social implications of new policies without considering their acceptance levels among the agents involved in the last mile. The new goods distribution policies proposed to the receivers were: an Off-Hour Deliveries policy (OHD), where goods distribution is made during the night time, both staffed deliveries (with the presence of the retailers in their premises to receive the goods) and unassisted deliveries (the carriers deliver the goods in an external or internal warehouse without requiring the presence of the retailers); and a policy which use Urban Distribution Centers (UDC), where the goods are sent during the night time and the last mile is delivered during normal commercial hours using smaller environmentally friendly vehicles. The methodology used is based on discrete choice models and more specifically in a mixed logit model (Train, 2009). This model has a hedonic formulation with random parameters which represent the variations in tastes across individuals. The distribution function chosen for the parameters depends on the variables themselves and should be the most appropriate to adequately reflect the real distribution of the values of the parameters in the population.
In this work the authors propose the use of a gamification approach in order to promote positive behaviours in the actors of Urban Logistics. The term ‘Gamification’ was firstly used in 2008 in a blog post by Brett Terill. The first documented use dates back to 2008 (Paharia) but the term did not see widespread adoption before the second half of 2010. Current uses of the term fluctuate between two related concepts. The first is the increasing relevance and presence of videogames in the everyday life. The second more specific is related to the concepts that game elements should be able to make other, non-game products and services more enjoyable and engaging as well. The Gamification consists in “the use of game design elements in nongame contexts”. Brett Terill described the term as “taking game mechanics and applying them to other web properties to increase engagement”. The use of the game-mechanics in a nongame context is encouraged by the studies concerning the players’ psychological stimulus and also by the studies concerning the player learning curves. The Gamification can be applied to different environment such as: Recruitment, Customer Engagement, Problem Solving, and Employee Engagement. The Gamified learning curve it’s different from a “normal” learning not from a skill point but from a time-to-learn point of view: the Gamified approach it’s faster than the normal one. Considering the question ‘why do games have such a radically different learning curve than advanced applications, the answer is that Gamified approach turns out that games are carefully tuned machines that hack into human being’s most fundamental learning processes. Games are exercises in applied psychology at a level far more nuanced than your typical application. In order to fulfill this goal there is a simple technique called “exploratory learning”. It’s authors’ belief that in order to improve the quality of life in cities it’s important to solve congestion, pollution, and other similar problems caused by traffic and Urban Logistics. Recently studies has shown that E-Commerce caused the increasing of traffic problems, because products bought on internet have to be delivered to the customers’ home by a lot of carriers and trucks moving in the hearth of the cities. One other problem is that public transportation is not enough efficient for all the citizen’s needs. Restrictions, prohibitions, and other forms of negative input to the citizens often not achieve the expected goal. Proposed solution ignore the complex social or personal motivations that people have when considering different behaviours, for example shopping on the commute to work, dropping of passengers on the school run or the weekend excursion; some of which are possible as a ride share. Furthermore, public organizations’ employees are more involved in bureaucratic stuffs than contributing to the improvement of the quality of citizens’ life. All those actors, such as 3PLs, citizens, and public administrations’ employees, have to be engaged and have to collaborate in order to change their behaviours, encouraging the positive ones while discouraging the negative ones. This is the reason why the gamification approach it’s particularly fitting with the problems listed above. We have to identify the way to motivate the people for moving in group, using the bike or walking in the city, involving and engaging them, instead of prohibiting and imposing. The idea that authors intended to promote it’s using the gamification in Urban Logistics for solving difficult/complex logistics problems using the “secret ingredient” of gamification, which is “fun”. Using players’ solutions as starting points for new business solutions, leveraging collaborative approach. There are several works which consider a Gamification application to real word problems. We briefly summarize, here, the main related concepts. Gamification is obtaining a lot of interest both in industry and also in academia during the past years. An increasing number of games are offered as services to consumers. It has been also considered from the perspective of service marketing as ‘a process of enhancing a service with affordances for gameful experiences in order to support user’s overall value creation. The current understanding of gamification has been primarily based on the act of adding systemic game elements into existing environments. Another viable approach proposes to leverage the experiential nature of games and gamification, instead of the systemic understanding.
Economic growth and vitality is dependent upon a well-functioning urban freight system. But a side-effect of this freight system is the accompanying traffic congestion and pollution issues. Therefore, orchestrating freight activity in a manner that maximizes efficiency and minimizes negative externalities is essential to the quality of life of citizens. Off-hour deliveries (OHD) is a Traffic Demand Management (TDM) strategy that has been proven to satisfy the goals of maximizing efficiency within the network and minimizing negative externalities. However, one major challenge for OHD implementation in the long term is the provision of cost effective incentives to promote OHD participation. Despite the benefits of OHD to the overall society, receivers - the key actor that decides on delivery time – are often unwilling to accept OHD as they see no direct benefit for their participation. In order to identify incentives that are effective, self-sustaining, and cost-effective to public agencies, there needs to be analysis done to evaluate the effects of different incentives. This type of analysis was undertaken in the OHD implementation project in New York City which was led by Rensselaer Polytechnic Institute (RPI) and the New York City Department of Transportation (NYCDOT) with support from the United States Department of Transportation - Research and Innovation and Technology Administration (USDOT-RITA). As part of the research the team conducted a behavioral survey about varying incentive both monetary and non-monetary and how they influence participation in OHD. The monetary incentives were a one-time monetary incentive and carrier discount and the non-monetary incentives were business support, public recognition (for participating in a sustainable strategy such as OHD), and having a trusted vendor. The rigorous econometric model was able to quantify the non-monetary incentives. The most important incentive that came out of the study was that of having a trusted vendor, which was found to be valued the highest by the responders with a subjective monetary value ranging from $1,741 to $36,538; this shows the importance given to this factor by some industry segments. From these findings arose the idea of creating a trusted vendor program (TVP) which would essentially provide trusted vendors for companies without one which would assuage receivers’ concerns and increase their confidence in allowing vendors into their facilities to conduct OHD, minimizing the perceived risk of damage or theft. The TVP would vet the vendors and certify those that meet the requirements as vendors that will be able to conduct safe unassisted (unstaffed) off-hour deliveries (UOHD). This phenomena of a trusted vendor having a value to be able to influence receivers to switch to OHD is the catalyst of this research. The objective of this paper is to assess the attitudes of different industry sectors towards having a trusted vendor program (TVP) which will enable identification of industry sectors that are most receptive to the TVP. A survey conducted in 2014 further explored this concept of having a trusted vendor program and how it may influence participation in OHD. The survey included respondents from The survey asked about the likeliness of a receiver to participate in OHDs given that they have a vendor that has been certified by a reputable organization as a trusted vendor. The question posed to the respondents is as follows: “If one of your vendors is certified by a reputable organization to do deliveries in the night hours, how likely will you be to consider allowing that vendor to make deliveries at night without any of your staff present?” The response options to measure the likeliness were: Completely Likely; Very Likely; Neither Likely, nor Unlikely; Not Likely; and Completely Unlikely. The research approach is to utilize behavioral modeling to analyze the responses collected to determine the acceptability of the program and the attitudes that varying industry sectors may have towards it. This research will add further insight into the previous findings that there is a monetary value that can be placed on having a trusted vendor and the effectiveness of formulation a trusted vendor program that is able to certify that a vendor can be trusted to perform OHDs which would minimizing the risk to the receiver’s business, influencing a switch to OHD.
Modeling the choice of shipment size is a canonical aspect in developing a freight transport model which also considers logistic choices. The embedding of the shipment size choice into the mode choice explains a large proportion of the otherwise unobservable variance and therefore enables the identification of further characteristics with systematic influence. Based on the development of a discrete shipment size choice model for road transports as a first step a consistent conjunction between logistic choices and the discrete mode choice can be realized. Since there exists a huge variety of shippers the induced behavioral heterogeneity should be taken into account. As the integration of underlying industrial sectors and logistical attributes leads to insufficient explanatory power and an inflation of the model in the statistical sense the identification of behaviorally homogeneous groups is considered to be able to reduce the heterogeneity satisfactorily. The observations of the used dataset were collected via computer assisted personal interviews (CAPI) with responsible logistics employees of logistics related companies. The chosen enterprises were sampled from a German-wide business directory with about 10000 addresses whereby unsuitable members of the sample were excluded through a multicriteria screening. In each interview two representative transports and the corresponding attributes are ascertained. Based on the categorization of the shipment sizes into three classes (piece goods, partial loads and (multiple) full loads) and the application of the Economic-Order-Quantity-Model (EOQ-Model) a Multinomial Logit Model with 487 observations is estimated. The identification of the behaviorally homogeneous groups is realized by an attribute-based latent class analysis (LCA) approach. The identified latent classes are subsequently integrated into the Multinomial Logit Model. The EOQ-Model as the core of the shipment size choice for road transports explains a major proportion of the prevalent variance. The signs and the magnitudes of standard influencing variables are plausible and as expected. Only the influence of the cost of capital is smaller than predicted by the classical EOQ-Model. This effect is already described in the literature and we try to give explanations based on logistics considerations. The LCA based on the attributes of the transported goods revealed four latent classes which could be denominated as (temperature-controlled) food products, special goods, unpacked bulk goods and miscellaneous standard cargo.
Road pricing is increasingly adopted by local governments to curb congestion and pollution in cities all around the world. The London Congestion Charge, introduced in 2003 and then modified to extend the treated area, is probably the most well-known and studied example (Banister, 2003; Givoni, 2012; Ison and Rye, 2005; Prud’homme and Bocarejo, 2005; Quddus et al., 2007; Santos and Bhakar, 2006; Santos and Fraser, 2004; Santos and Shaffer, 2004). However, the literature has not reached a consensus on the socio-economic advantages of such measures since costs seem to exceed benefits in terms of a reduction in external costs (Mackie, 2005; Prud’homme and Bocarejo, 2005; Raux, 2005). The rationale for the introduction of road pricing is related to the theory of Pigouvian taxation for which a tax equal to the external marginal cost in equilibrium will decrease the equilibrium quantity of transport consumption and corresponding externalities. According to this view, it is essential that transport demand react to an increase in transport cost. Although this claim is reason- able from a theoretical point of view, the effective contraction is an empirical matter and depends on the benefits from private transport for road users. In principle, under inelastic demand, all road users may be willing to pay the charge and in this case no charge in the equilibrium quantity of services will be observed. To shed light on how traffic flows react to the introduction of road pricing, in this paper the case of Milan is analyzed. Milan has one of the highest rates of car ownership in Europe. More than half of the population use private cars and motorcycles, ranking Milan second only to Rome, and among the highest in the world (Percoco, 2010). In January 2008 the Ecopass programme was launched within a designated restricted traffic zone corresponding to the central “Cerchia dei Bastioni” area of 8.2 km². The amount of the charge depended on the vehicle’s engine emissions standard and fees varied from C2 to C10 from 7:30 a.m. to 7:30 p.m. on weekdays. Free access to the zone was granted to motorbikes, to several types of alternative fuel vehicles and to conventional fuel vehicles compliant with the European emission standards Euro3 and Euro4 or better. An estimated 98,000 vehicles a month were entering the restricted area before the Ecopass came into force (AMMA, 2008a). According to an evaluation conducted by the Milanese Agency of Mobility and the Environment (AMMA) in December 2008, during the first month traffic inside the ZTL fell to 82,200 vehicles, and for the first eleven months the average traffic flow was 87,700 vehicles. This represents 12.3% fewer vehicles entering the ZTL, while outside of the Ecopass area, traffic decreased by 3.6%. In a public consultation on June 13 2011, the vast majority of voters (79%) approved the introduction of the Ecopass, which was re-established on January 16 2012 under the name Area C, consisting in a sizable enforcing of the scheme as 10 types of previously uncharged vehicles went under the charging scheme and other 10 types of cars and vans were forbidden to enter the city center. In this paper, we study the effect of this enforcement on vehicle shift, i.e. on the usage of GPL and methanol commercial vehicles. In particular, a novel data set consisting in 75 types of vehicles with average daily traffic counts at monthly level observed between January 2008 and December 2012 is used to estimate the impact of the scheme occurred in January 2012. To this end, a synthetic control approach (Percoco, 2015) is proposed, consisting in estimating a counterfactual time series by weighting the time series of control vehicles for GPL and methanol commercial vehicles. This approach allows to estimate the effect of road pricing across types of vehicle and across time. Results point at a sizable effect on both GPL (+240 vehicles, corresponding to +45%) and methanol (+433 corresponding to +47%) vehicles. No effect is detected for hybrid and electric commercial vehicles.
Twenty years ago a French national research programme “Goods in the city” was implemented with three important surveys in three cities: Marseille (1,050,000 inhabitants), Bordeaux (750,000) and Dijon (240,000). A large number of attempts had been based beforehand on the O-D matrix paradigm (Ambrosini and Routhier, 2004; Allen et al., 2012) and most frequently focused on a single unit of observation (the transport of a certain weight between an origin and a destination) which was not necessary sufficient for explaining a part of road congestion (Holguín-Veras and Patil, 2007). It then appeared that it was necessary to organise delivery surveys for whose the central unit of observation was “the movement” (pick-up or delivery), in order to fuel analysis of urban goods transport and also the FRETURB model (Routhier and Aubert, 1999, Routhier and Toilier, 2007, Bonnafous and alii, 2013). Unfortunately, it was not possible to improve these analysis or the calibration of the FRETURB model on the base of time series because the lack, until the last months, of new surveys. The main explanation is the very high cost of these surveys: in France today, a survey like those described above costs from $1.7 and $2 million. Fortunately, a new wave of surveys is currently in progress in the Paris region and again in Bordeaux (and soon in Marseille), which methodology is exactly the same than for the first wave.

This communication presents the first results and comparisons allowed by the recent surveys of Bordeaux and Paris. Two types of information are involved in these delivery surveys (Patier and Routhier, 2009). The first is related to the stopping of the vehicle during the delivery: time, place, duration, in a reserved space or on the road, size of the vehicle, etc. The second is related to the trips linked to the sequence of movements: distances, round organisation, times, etc. These surveys addressed firms that shipped and received goods and drivers that ensured the transport. For both the firm and driver, the information was collected at the place where contact existed between these two actors: the place of movement. It was therefore possible to capture simultaneously information on three fundamental elements of understanding urban goods transport: the logistic organisation of companies at firm level, the environment of the loading and unloading points and the organisation of transport.

Because the duration of a twenty years period between the two waves of survey, the new database will not provide any time series but it will allow diachronic analysis for Bordeaux and a new cross section analysis with the present survey on Paris and Bordeaux. Thus our proposal is a communication will bring some answers to the main issues on central parameters of the urban goods transport. These issues will be organised according to the logic of FRETURB model and can be summarized in two main questions:

1) To what extent the assumptions underlying the model are validated in Bordeaux twenty years later?
2) To what extent these assumptions are validated in the case of Paris (investigated for the first time)?
Urban freight transport in cities of India has developed as a highly decentralized industry. Goods delivery is done by single vehicle owning transporters and the size and type of vehicles exhibit a wide variation. The choice of vehicles for goods delivery are determined by availability of vehicles, cost, infrastructure limitations, policy restrictions, and behavior of shippers among other factors. While there has been some research on urban freight generation (Holguin-Veras et al., 2013) and choice of mode/vehicle type (Arunotayanun and Polak, 2011), relatively less work is available on jointly modelling the two dimensions (Holguin-Veras, 2002; Holguin-Veras et al., 2011). In passenger transport, the related dimension of vehicle/mode choice jointly modeled with other travel choice dimensions has been extensively studied and their benefits well understood. The present study focuses on joint models of urban freight trip generation and vehicle type choice. We argue that the choice of vehicle and the number of trips generated are joint decisions and therefore have to be modelled jointly. The proposed model would help develop better urban freight transport plans and policies.

We use data collected in Chennai, India for analysis. Data from over 195 establishments were obtained including details on number of freight trips attracted and produced, the mode/vehicle type used for the trip, and other details about the establishment. The range of vehicles include motorized two wheelers, three wheelers, cars, small pick-up trucks, to larger trucks. The two tables below summarize the number of observations in the data set containing each vehicle type and the average number of trips produced/attracted.

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Observations</th>
<th>Mean Number of Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bikes</td>
<td>43</td>
<td>2.7</td>
</tr>
<tr>
<td>3-wheeler</td>
<td>47</td>
<td>1.8</td>
</tr>
<tr>
<td>Cars</td>
<td>4</td>
<td>2.3</td>
</tr>
<tr>
<td>Small pick-ups/Vans</td>
<td>119</td>
<td>2.4</td>
</tr>
<tr>
<td>2 axle single unit trucks</td>
<td>55</td>
<td>1.2</td>
</tr>
<tr>
<td>3 or 4 axle single unit trucks</td>
<td>22</td>
<td>0.6</td>
</tr>
<tr>
<td>Large trucks</td>
<td>6</td>
<td>0.3</td>
</tr>
<tr>
<td>Others</td>
<td>15</td>
<td>0.9</td>
</tr>
<tr>
<td>Total trips</td>
<td>195</td>
<td>3.1</td>
</tr>
</tbody>
</table>
Freight transport in the city plays an extremely important role, especially for the people who buy goods in shops, workplaces, entertainment centres or order goods to the house. According to D. José and A. V. de Magalhães a urban freight transport (UFT) “includes all the movements of loads that have an origin and/or destination in those areas, as well as inter-city displacements inside metropolitan regions, and those movements that only cross the urbanised area” [De Magalhães, 2010]. In the literature, discussion on urban freight transport relates mainly to a narrow range, such as the optimisation of the group of goods to customers located in the city. There is a need for a holistic approach and interdisciplinary research in the field of freight transport in the city, especially from the perspective of urban management [13]. One of the few examples dealing with the problems of urban freight transport, from the point of view of urban management, is the research carried out by M. Lindholm, Sweden [Lindholm, 2012; Maria Lindholm, 2014]. Freight transport in urban areas results in congestion, air pollution, noise, increased logistics costs and thereby increased prices of products. Effective and efficient freight transport requires the involvement of many stakeholders. There are several stakeholders who are indirectly or directly involved in urban freight transport. Among them we can distinguish [Ballantyne, Lindholm and Whiteing, 2013; , Rueesch and Glücker, 2001; Stathopoulos, Valeri and Marcucci, 2012; Quak, 2012]: shippers (sender of goods, consignors), transport companies, consumers/consignees, public administration: local government, and national government. Unfortunately, the needs and expectations of city logistics stakeholders are usually different [Tanguchi and Tamagawa, 2005; Tseng, Yue and Tayslor, 2005]. A key role in the area of city logistics, including urban freight transport, is played by local government, which should develop a freight transport plans, including in it stakeholders’ expectations [Filipia et al., 2010]. It is the local government, which through different types of regulatory tools, may impose solutions in order to improve the movement of goods and people within the city. However, the effective and efficient implementation of projects related to urban freight transport can be undertaken only in cooperation with other stakeholders. There are two main purposes of the paper – a theoretical and an empirical one. The empirical aim of this paper is to identify the methods of cooperation between local authorities and other urban freight transport stakeholders in European cities. The theoretical purpose is to develop a reference model of local authority cooperation with stakeholders for urban freight transport. In order to obtain above mentioned purposes the authors will conduct a survey among local authorities in European cities. The survey will be conducted via e-mail with representatives of transport departments. The survey will help to elicit answers to the following questions: What kind of methods of cooperation, formal or informal, between local authorities and other urban freight transport stakeholders occurs mostly in research cities? What are the procedures for formal methods of cooperation? What kind of factors influence formal and informal cooperation between local authorities and other urban freight transport stakeholders? What is the correlation between involving freight transport into long-term planning and methods of cooperation for urban freight transport on the part of local government? What is the correlation between including into organisational structure departments (persons) responsible for freight transport and methods of cooperation for urban freight transport on the part of local governments? In order to obtain the purposes and answers to the above questions the multidimensional analysis will be applied. Due to the necessity of simultaneous process of collecting various information from stakeholders in the paper the integration of different methods enabling multidimensional analysis will be applied. The integration approach is understood here as a simultaneous use of several methods, , such as: correspondence analysis [Andersen, 1997; Clausen, 1998; Greanacre, 1998] and logit analyses [Agresti, 2002; Harell, 2001; McCullagh and Nelder, 1989].
When subject to toll increase, freight carriers often adjust their behavior to mitigate the impact of additional operational costs. One of the potential behavioural responses for carriers is to change the delivery route and reduce mileage on toll roads. Understanding freight carriers’ route change behavior in response to toll increase is very important as it directly influences freight traffic and the consequent externality patterns. This study will investigate this issue using empirical data collected from New York State, USA. In the survey, each carrier first indicated whether or not they would change routes, and if yes, by how much they would reduce the mileage travelled. The carrier only answered the second question if they answered “yes” in the first question, resulting in a sample selection process. Traditional sample selection models (Heckman 1979) assume independence among observations, which may cause problems in freight agents’ behavioral studies. In a competitive freight market, behavior of one agent often significantly influences their peers’ behavior, leading to interdependencies among agents. And intuitively, carriers serving adjacent locations, either adjacent origins (shippers) or adjacent destination (receivers), tend to have stronger influence on each other than those serving distant locations. In order to capture such interdependency effect, this study will develop a sample selection model with two successive spatial autoregressive filters, analyzing the spatial interaction at both the origin and the destination, i.e, a model with OD filters. The origin filter recognizes the fact that carriers serving neighboring shippers tend to have similar behavior, and the destination filter captures the spatial dependency in receiver end. The product of the two filters will further capture the spatial interaction caused by the delivery tour linking the two ends. In spatial econometrics, OD filters were first introduced by LeSage and Pace (2008), but limited to analysis of single regression equations. This study will extend this area by allowing analysis of behavioral data using multiple equations. The proposed model will be estimated using a Bayesian MCMC method because the likelihood function involves a multi-dimensional integral. The model performance will be evaluated by measuring the parameter recovery capability using simulated dataset before being applied to the empirical data. With the rich information collected from the survey, this study will identify the connections between carriers’ route change behavior and their characteristics. The model will also quantify the magnitude of peer influence through the spatial OD filters. As the link between shippers and receivers, freight carriers’ behavior should be characterized by both origin and destination. Considering the interaction between freight carriers thus requires the consideration of both ends. This paper accommodates this feature by developing an innovative sample selection model with spatial OD filters. It investigates the spatial interaction at both the origin and the destination ends. The model will be estimated using Bayesian MCMC inference method and validated by a set of simulated dataset. Its application to the stated preference data collected from NYS, USA will provide important insights that enable a better understanding of carriers’ route choice behavior. The innovative sample selection model with spatial OD filters will be specified, estimated, and validated in this paper. It will provide a solution that appropriately specifies the spatial interactions caused by freight flows. The effects of various influential factors will be estimated, such as carriers’ characteristics, market conditions, and spatial interactions.
The freight system conveys the supplies needed for modern life, generating tremendous benefits as well as negative impacts on quality of life, sustainability, and environmental justice. MAP-21 explicitly indicates the importance of freight studies for public sector (U.S. Department of Transportation 2013) and calls for effective freight policies to reduce congestion, mitigate pollution, and improve supply chain efficiency. To propose effective policies, studies first need to understand freight agents’ behavior. Unlike its passenger counterpart, where trip decisions are made solely by travelers, freight activities are determined by multiple agents, including shippers, carriers and receivers. Disregarding interactions between agents may prevent the research community from fully understanding the decision mechanism, leading to misleading assessments of policy effects on each individual decision maker, and consequently, poor predictive power. For example, peak-hour tolls aimed at congestion relief could not shift truckers’ travel patterns as intended because those routes and schedules are jointly determined by not only the truckers, but also receivers who may have conflicting preferences. It is generally agreed that the interaction between freight agents’ relative market power is critical for the freight activities. For example, Holguin-Veras (2008) suggested that carriers could not pass tolls to receivers when toll was increased, because the receivers played the dominant role in the market. Another study of Holguin-Veras et al. (2006) further found that certain types of carriers (e.g., out of the New York-New Jersey region and with small-size trucks) possessed low market power, because they were sensitive to the time of day pricing policy. Intuitively, as economic agents are in the production-consumption links, the interactions between freight agents are mainly economic via market dynamics. The key factors characterizing interactions between economic agents should be the extent of market (e.g., perfect competitive, oligopolistic, monopolistic, etc. (Reiss and Wolak 2007) and information available to the economic agents (e.g., complete, symmetrically incomplete, and asymmetrically incomplete). Although freight agents’ market power has drawn increasing attention from the research community, empirical studies of its influence on freight behavior are still quite limited. This study explores this issue through investigating carriers’ capability of cost passage when they are subject to toll increase. This capability characterizes carriers’ market power relative to receivers: When carriers have the absolute market power, they can charge all increased operation costs to their receivers, without sacrificing any of their own profit. When receivers have dominant market power, carriers may have to absorb part or all of the increased operation costs to remain competitive. Therefore, the degree of the increased operation costs that a carrier absorb is a reasonable indicator of a carrier’s market power relative to its receivers. In order to obtain the degree of toll passage, this study conducted a stated preference survey among carriers in the New York State (NYS). The survey asked carriers not only the indication of whether or not to pass the increased toll, but also the percentage that they can pass. The study also recognizes that carriers’ market power is potentially determined by carriers’ characteristics and market conditions. The study obtained carriers’ characteristics from the survey, including the types of goods delivered, typical delivery tours, carriers’ location, and company business information, etc. Market conditions are characterized by census statistics, such as population density and employment entropy. These influential factors are analyzed using descriptive statistics and econometric modeling to gain insights into carriers’ market power. Effective freight policies can improve supply chain efficiency and reduce freight system’s externalities.
The economic globalization and rapid development in e-commerce have lead to a boost in freight transportation demand. However, the development also bring along externalities such as the economic losses, environmental pollution and health issues. As a result, companies and transportation professionals are working hard to develop management schemes that allow for more efficient delivery vehicle usage. This study focuses on a popular metric used to evaluate the delivery vehicle's efficiency – load factor – for small, medium and large delivery vehicle trips in the New York State. The objectives of this paper are: 1) Obtain systematic and updated load factor data for trucks in the New York State; 2) Explore the determinants of load factor of loaded vehicles, and propose recommendations accordingly. This study uses three separate linear beta regression models to study the determinants of small, medium and large delivery vehicle trips in the New York State. The models take into account the effects of cargo type, fleet size and trip distance. The primary data source used in this study is a stated preference survey conducted in New York State in 2014, which is designed to collect information on freight carriers’ behavioral changes in response to hypothetical toll increases. The dataset contains 370 disaggregate observations that allow for both trip-level and vehicle-level analysis. The results indicate that: 1) There exists substantial difference between factors influencing small, medium and large delivery vehicle’s load factors; 2) The effect of cargo type on load factor depends on the commodity size, packaging, weight and other delivery requirements; 3) Load factor is generally higher for big companies with large fleet size; 4) For small delivery vehicle trips, the load factor increases with the distance, while the opposite is true for medium size delivery vehicles. There’s no obvious effect of distance on large delivery vehicle’s load factor. The influencing factors identified in the study can help the policy makers understand the connections between load factor and a set of vehicle/logistics conditions, enabling more effective policy design to improve freight transport efficiency. The study presents a series of unique load factor data in the current US market, which can be used to compare with the statistics in other countries, or as a baseline data for future studies. The influencing factors identified in the study can help the policy makers understand the connections between load factor and a set of vehicle/logistics conditions, enabling more effective policy design to improve freight transport efficiency.
Central business districts (CBDs) are major destinations for goods pickup and delivery in many urban centers. One of the most expensive components of urban freight is the cost of “last mile” delays in CBD where truckers navigate through congested metropolitan areas looking for appropriate parking. When parking is scarce, unavailable, or even far from the final delivery point, truckers frequently park illegally and consider the potential ticket as “the cost of doing business”. As a result, parking tickets have been increasing. In Toronto, issued parking fines increased by 70% from 2006 to 2009, thus encouraging city planners to revise urban truck parking management policies (Haider, 2009). Policies such as time restrictions, pricing, space management, enforcement, and off-peak delivery have been imposed in different cities to manage urban truck parking (Nourinejad et al., 2014). Among these policies, parking enforcement is imperative for two main reasons. First, a ratio of the generated revenue from parking citations is allocated to the city. This ratio is roughly 75% in Toronto and the remaining 25% is dedicated to financing the cost of parking enforcement. Second, parking enforcement when accompanied with lower parking violations leads to enhanced flow of traffic which is equivalent to increased social welfare. As an example, hindrance of double parking through enforcement keeps the lanes clear of obstructions for smoother flow of vehicles. For these two reasons parking enforcement is imposed with the objective of maximizing either or both social welfare and generated revenue. Nevertheless, enforcement alone is not efficient when truck drivers are insensitive to receiving parking citations. In Toronto, from the ticket citations that were issued to delivery trucks in 2009, a total of $1.5 Million worth of fines were receded in court (Haider, 2009). The cancelled tickets cause a negative externality in the system since the enforcement authorities are unable to claim the citation penalty and the delivery agencies have to pay for the cancellation expenses. In light of this negative externality, some cities offer fixed-price parking permits to delivery agencies, thus allowing them to park in parking restricted zones for free. The permits, if proliferated, allow enforcement agencies to alleviate parking inspection since the truck drivers have already paid for parking via the permit. The delivery agencies would benefit as well if the permits are affordable. Although parking permits are now issued in many cities such as Vancouver, Washington D.C., and Houston, there is vast discrepancy in how the policy is implemented in each city. For instance, Vancouver charges only $40/year per truck for a maximum of 30 minutes parking in loading zones, passenger zones, or any other meter stall except during rush hour, whereas Houston charges $1,285/year per truck for a maximum of two hours for parking in a loading zone or a metered stall. We hypothesize that each city develops its parking permit policy based on factors such as the cost of enforcement, parking demand, traffic conditions, impact of illegal parking on through-traffic, and available parking supply. The objective of this paper is study the impact of these factors on both social welfare and generated revenue and profit. The methodology is described below. Urban parking behaviour, for both passenger vehicles and trucks, is understood to form as a reaction of drivers to policies. For instance, increasing both parking enforcement and parking fines prompts drivers to find legal parking to avoid the high penalty of citation. The less acknowledged aspect of parking, however, is the reaction of parking policy-makers to parking behaviour. For instance, increasing parking enforcement as a policy is not suitable if the majority of the tickets end up getting cancelled at court. Hence, any policy analysis should simultaneously consider the policy-maker and the drivers. The problem has distinct similarities with the non-cooperative inspection game where an inspector verifies whether another party, called the inspetee, adheres to legal rules (Avenhaus, 2004). Inspection games have many applications including fraud detection, arm control and disarmament verification, and barrier-free bus fare control.
The urban waste management industry deals with the collection, transport, processing, recycling, disposal, and monitoring of waste materials. Although each aspect of the waste cycle is crucial, the collection process tends to be the most significant and costly portion of the entire activity. Therefore any cost savings that can be made in this area would potentially improve service in other areas and result in major budget savings. In the context of municipal solid waste collection, this involves the use of remote sensing technologies at garbage bins to relay information to a central server about bin fill-levels. The central server would then take into account each day’s bin fill levels and dispatch the appropriate number of vehicles on specific routes to the given pick up locations.

With the availability of each day’s bin fill-level information, the dispatcher still has to decide which bins to serve. One reasonable assumption would be to visit only those bins that are near capacity. This policy, however, is not necessarily optimal as it does not exploit the opportunity of visiting bins of lower fill-levels in an attempt to save future costs. In this paper, we propose an anticipative model, called the Remote Assessment Sensor Routing Problem, which would minimize each day’s costs while taking into account the implications of that day’s action on future costs. To model the problem, we use an approximate dynamic program where a continuous approximation model of vehicle routing is used to estimate the expected future routing costs. Use of the continuous approximation models is critical as it substantially reduces the search space of the optimization problem leading to reduction of computation time.

The proposed model is compared to three benchmarks. The first benchmark, called periodic routing, represents contemporary waste management practice where bins are visited based on specific schedules. This benchmark helps evaluate whether the remote assessment technology can improve status quo. The second benchmark is called perfect hindsight as it assumes complete information about the waste production of each bin. This benchmark, although not realistic since complete production information is not available, is used as a lower bound to the minimization problem. The third benchmark, called the myopic model, is designed for the remote sensing technology but it is not predictive of future demand. This benchmark only considers each day’s costs and disregards future costs. A simple example of this benchmark is to visit only the bins that are near capacity. This benchmark helps evaluate whether more advanced decision-support models that consider future production patterns will increase the benefits of the technology.

Results show that the perfect hindsight model is the most optimal and the periodic routing model is the least. The performance of the approximate dynamic programming model is dependent on the variability in waste production. Under high variability, the proposed model can save up to 20% compared to the periodic routing model and is within 12% of the globally optimal solution.
Freight forecasting in the United States has historically relied upon commodity-flow data, either purchased from commercial vendors or, more recently, made publicly available through the Federal Highway Administration's (FHWA) Freight Analysis Framework (FAF) program. For forecasting future freight flows, however, these sources provide static portrayals of existing trends. To forecast freight flows based on alternative assumptions—the impacts of infrastructure investments, operating policies and regulations, competition between regions, global trade patterns and macroeconomic shifts—requires a more flexible approach. Buyers and sellers (receivers and shippers) represent the endpoints of supply chains. While carriers and distributors play critical intermediate roles, the flows between buyers and sellers largely determine origin-destination patterns of freight movements. Their roles are larger than this, however, as these microeconomic decisions to trade with a particular business partner aggregate to comprise regional and even global economies. In this research we describe a scenario modeling tool developed by the Chicago Metropolitan Agency for Planning (CMAP) for forecasting future freight flows under different sets of investment, policy and macroeconomic assumptions; to perform focused analysis on specific industries; and to answer questions as to how these factors might affect the freight-dependent business community. The central component of this system is an agent-based model of the relationships between buyers and sellers of commodities that generate freight movements, provisionally called the procurement market game (PMG). PMG produces emergent market behavior that results from starting conditions, which include game-theoretic payoff values, assumed decision-maker utility expressions, production demands and constraints, and transport-logistics costs represented by buying and selling agents. Agents follow relatively simple sets of rules in interacting with other agents. By modifying agent decision rules, payoffs and starting conditions, it is possible to test a wide variety of potential markets and assumptions. Through iterative play, agents learn about other agents and their position in the market and seek trading relationships that lead to higher payoffs. The modeling approach used in PMG is inspired by the theory of buyer-seller networks proposed by Krantz et al (2001) and incorporates concepts for agent interactions from other sources. It is similar to a principal-agent screening game of moral hazards with post-contractual hidden information (e.g. Stiglitz and Weiss, 1990; Rasmusen, 2006), but is considerably more complex because it involves multiple principals and agents, buyers and sellers, and is a repeated game with feedback and belief updating. To our knowledge, this is the first attempt to apply an agent-based gaming approach to model the evolution of relationships between shippers and receivers for public sector freight forecasting. A number of researchers in freight modeling have advanced other game-theoretic approaches, most notably to capture the symbiotic relationships between shippers and carriers in supply-chain formation (e.g., Harker (1983) and Harker and Friesz (1986). These model formulations solve for variations on Cournot-Nash equilibrium solutions to predict network flows under profit maximization and assumptions of perfect competition, resulting in a generalized spatial price equilibrium model (GSPEM). An early version of Friesz’s work contributed to the Freight Network Equilibrium Model (FNEM) developed by George Mason University under funding from the U.S. Department of Energy and the U.S. Central Intelligence Agency to model global freight traffic. Subsequent research by Friesz and Holguin Veras (2005) provided theory for dynamic extensions to the GSPEM framework. More recently, Holguin Veras et al (2007) modeled games between carriers and receivers to study cooperation on the issue of off-hour deliveries, developing a mathematical programming solution. Meanwhile, incorporating macroeconomic drivers into these mathematical programming formulations, using computable general equilibrium models of the national economy, have proved to be mathematically challenging, and validation has been elusive (Friesz and Kwon, 2007).
The increasing urbanization, population growth and changes on demand patterns, has led to increasing urban freight movements. Despite the relevant role of urban goods distribution and supply requirements to urban populations in the sustainable development of cities, it also generates negative impacts on the economic power, accessibility, quality of life and on the attractiveness of urban areas. Under such context, society is becoming more demanding in terms of sustainability, putting public administrators’ and private operators into a difficult challenge, which cannot be delayed anymore. Urban logistics stakeholders are expected to maintain and promote the cities sustainability, mobility and quality of life, while ensuring that urban goods distribution systems efficiently serve their city’s needs. As a result, there is the need to promote urban goods distribution new solutions that are environmentally friendly and, at the same are efficient enough to satisfy both society’s and distribution companies’ needs. Research has identified new solutions that potentially reply to both requisites, from operational and strategic levels of intervention. At the strategic level of intervention, the use of technologies to pursue the concept of analytic cities (such as real-time traffic management) is increasingly popular. At the operational level, solutions resulting from the intervention within the distribution fleet (by a technology shift or by a vehicle downsizing) are also being disseminated as best practices on urban logistics. Despite its trendy promotion, research does not present yet, at the best knowledge of authors of this paper, an overall quantitative analysis of the effects of those solutions. Such analysis should identify the system efficiency, economic, social and environmental effects of the initiative, considering the affected stakeholders group. This research paper addresses that gap, by analyzing the effects of a combination of technology shift and vehicle downsizing, by considering the change to small electric vehicles and to cargo-bikes, applied to the city of Lisbon (Portugal). Results are then compared with others from related studies and data is presented on the effect of the replacement rate on the viability of the measure, the maximum geographical range of small vehicles to deliver goods and the effects of the initiative on other users of the road infrastructure. In order to assess the impact of this set of innovative urban logistics solution, authors built a model using microscopic traffic commercial simulation with AIMSUN (Advanced Interactive Microscopic Simulator for Urban and Non-Urban Networks). AIMSUN allows to model the traffic conditions in the selected area, identifying the road network critical areas and analyzing the most relevant journeys made by goods vehicles seeking to supply shops and services in the Lisbon downtown. The data provided by the Lisbon Municipality, reveals that commercial vehicles access the area of study, through eight major points. Additionally to the conventional commercial vehicles, vans and trucks, two further vehicle categories were included: small electric vehicles and cargo bikes. Specific vehicle parameter adaptations (vehicle dimensions, speed and acceleration profiles) were made to include SEV and cargo-bikes within the vehicle typologies. Their on-road dynamic performance was based on real world measurements of these vehicle types performing urban logistics activities.
Traffic management on real time is seen as a potential solution to reduce the energy demand from road transports. Traffic management on real time can be put into practice through the vehicles and infrastructure (V2I) communication. It exchanges operational and safety data between vehicles and road infrastructures and can also be deployed and developed using mobile telecommunication networks.

Under the umbrella of smart cities, traffic management on real time is being pointed out as the next step on urban transport management. However, despite its increasing popular reference, there is not an evaluation of the impacts of such systems, at the best knowledge of authors of this paper. Recognizing this gap, this work will use VSP methodology and microscopic traffic simulation to perform an ex-ante assessment of the energy, environmental, economic and traffic impacts of the introduction of communication technologies between vehicles and infrastructure. The objectives of this work is to achieve the quantification of energy, pollutant, economic and traffic flow impacts when using traffic management on real time. For that purpose, authors will apply the methodology to a Lisbon highway (A5) based on real counting data both from passengers and goods vehicles. Authors will also quantify the operational effects of an initiative mostly promoted by the public stakeholders on freight transport operators. Results show that traffic management on real time actually leads to a more sustainable transport as it reveals that when the acceptance guidance is up to 10%, the speed along the alternative new path increases, delays decrease, pollutant emissions also decrease and operation costs at an annual counting also decrease. The Vehicle Specific Power (VSP) methodology provides a simple approach of the forces that are applied to a vehicle. AIMSUN is an integrated modelling and traffic management software. This dynamic simulation model tracks individual vehicles, reproducing the monitoring of fleet vehicles in a real time fleet management system, gathering dynamic data (i.e. current position, previous position, current speed, etc.) while following the vehicle, in a similar way that in real life an equipped vehicle could provide. The selection of the case-study road was dependent on the available real-world driving data. Using an on-board data logger unit (i2D) collecting data from drivers, it was possible to obtain almost 4 months of real-world driving data within the region of Lisbon (Portugal). The selection of the case-study road was a standard route often used by those drivers and for which, there was also available real counting data. This road is the A5 highway that connects Lisbon and Cascais, with approximately 19 kilometers. This route was performed by drivers on several days, at different hours and directions. Along the peak hour, there are about 19 000 vehicles/hour in both directions of the A5 between Lisboa and Cascais. Vehicles parameters in the model were set with average standard characteristics, similar to the real-world driving vehicles. Comparing real vehicles data with others from the model, both with similar distance travelled and traffic conditions, it was verified that average speed was very similar in both cases, with a difference of 4% (112 km/h for the real vehicle, compared with 108 km/h for the vehicle from the model). However, as expected AIMSUN speed profiles are more smooth and homogeneous than real-world driving. Traffic flow data from the infrastructure and the identification of events based on vehicle dynamics that travel on that road, allows the recognition of parameters that define situations of congestion. Based on statistical data analysis, it were tested different algorithms that would trigger alerts to drivers in case of congestion and give them instructions to avoid it. The alerts sending a recommendation message on the board set by the infrastructure manager, according with the information received from vehicles, were emitted at 8 periods within the morning peak hour and remained active over 30 seconds. The comparison of operational, economic and environmental effects of prior to those alerts and after the implementation of those alerts based on real time traffic management, both for passengers and goods transport, reveal that traffic management on real time has positive effects on safety, energy and pollutant emission consequences.

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Access restrictions for urban freight transport has been recognized as the most important and most dominant instrument for city authorities to influence urban freight transport (Muñuzuri et al., 2005; Danielis et al., 2010). The same holds good for private cars. Majority of European cities (in particular those with historical centres) have introduced traffic control management systems to optimize the use of limited urban (traffic) infrastructure and to reduce congestion, noise and total emissions from goods and passenger transport in the city centres. Implemented systems are in general fixing delivery time windows for goods, limiting and defining conditions for entering and parking of motor vehicles of inhabitants, business owners and other users. Historical centres are in many cases categorized as pedestrian zones. These measures represent one of the most controversial tools used to limit the mobility of passenger cars and delivery vehicles in the city centres. The desirable effect of achieving a more pedestrian–friendly city is opposed with the danger of diminishing the accessibility of persons and goods to the city centre, with its subsequent degradation (Muñuzuri et al., 2005). In praxis, we are facing the problem of rigid and inflexible traffic control schemes implemented in the (old) city centres of European cities. Consequently, city centres are additionally losing their attractiveness for business social and other activities. The aim of the article is to review literature and analyse current practices of city centres access systems and to suggest solution(s) for dynamic and user friendly city traffic management system by means of use of the latest ICT solutions. The article will develop also a model for continuous development and exchange of (new) solutions among the cities based on living lab approach. Globalization heavily influenced transformation of economic, social and physical structures of cities all around the world. The constantly growing urban areas are faced, because of global production, also with growing demand for city logistics. Traditional commercial districts of the city centres were abandoned because they could not compensate for the requirements of changing expectations of the city dwellers from commercial areas (Kilic, S.E., 2008). Problems behind the loss of attraction of traditional commercial districts are beside that also the following: rise of new attraction centres in the suburbs; increasing insecurity as a consequence of the desertification of urban centres; high costs and difficulties in accessibility and parking in the urban centres; lack of leisure or entertainment facilities in urban centres; change in consumption and purchasing habits and growing competition among the different forms of commerce (P.A. Vidinha, F.M.R. Faria, 2007). These problems have attracted new forms of commerce (such as mall shopping, internet shopping etc.) thereby resulting in progressive deterioration of inner-city traditional commercial districts, creating new social and economic problems (J.L. Balsas, 2000). European city centres are important places of living and holding the value of cultural heritage, therefore many cities are searching for appropriate solutions and measures to revitalize (old and historical) city centres within the framework of sustainable volume of traffic. Cities are trying to provide good conditions for dwellers and business activities, but at the same time are faced with contradictory effects. Dwellers would like to have city centres without traffic, noise and CO2 emissions, commercial activities on the other side, good and frequent accessibility to their shops. ...
The aim of this paper is to estimate young consumers’ willingness to pay (WTP) for green freight transport goods. In this context, we conducted a questionnaire-based web survey among a group of university students, the generations of the future, who have a long view with respect to environmental issues. Recent solid results have shown the potential benefits deriving from the implementation of appropriate policies aimed at resolving the lock-in situation for retailers and transport providers. They are characterized by suboptimal situation both for urban freight distribution and off-peak deliveries. Among the different and relevant benefit-types envisioned by the adoption of such a delivery strategy, there is the reduction of polluting emissions. Indeed freight transport is a large contributor to CO₂ emissions and it is necessary to mitigate its environmental impact in order to reduce CO₂ emissions and become low-carbon society. Road freight activity in OECD countries has been growing at a rate quite content, i.e., 3% annually in the period 2010-2012, mainly for reasons related to the global crisis, while in emerging economies such as China and India it has increased between 11% and 17% from 2010 to 2012 (International Transport Forum, 2015). Clearly, the freight transport system is fundamental to the economic vitality (Muñuzuri et al., 2005). It is also recognized that freight transport is responsible for several social and environmental impacts. Green freight transport policies are expected to play a role in mitigating CO₂ emissions in the transportation sector (Allen et al., 2000). Involvement of consumers in sustainable consumption is a key issue to the impact that society has on the environment. Indeed, consumers’ involvements include, among others, the intention to purchase goods that comes from sustainable freight transport. Nonetheless, a number of socio-economic barriers still need to be overcome before sustainable freight transport can occur. In this context this paper uses stated preference methods (SPM), deploying contingent valuation method (CVM) assessing whether the young consumers WTP for green urban distribution (GUD) is sufficiently large for compensating retailers increase in costs. It is possible to envisage a financially self-sustaining business model for off-peak deliveries (OPD) or, alternatively, to indicate there is need of support from public policies. Most of the global and national policies have set targets to reduce CO₂ emissions and become low-carbon society. It has become increasingly clear that climate change mitigation policies must rely for a good portion on sustainable consumption. On the demand-side, households have an important role to play in addressing the environmental problems by changing their consumption behaviors in a sustainable way. Freight transport is responsible for several externalities which can be traced to three sustainability issues: environmental sustainability, economic sustainability, and social sustainability (Quak, 2008). Consumers play a key role in sustainable freight transport through the purchase of green freight transport goods which spur the development of sustainable transport. Our analysis fits in the recent strand of literature investigating consumers intentions towards green freight transportation (see among others Schniederjans and Starkey, 2014) and taking into account Italian university students WTP, exploring their knowledge, perceptions and attitudes related to green freight transport. The data collection has been conducted in the city of Perugia, in the Center-North of Italy. Data collection has been achieved through a questionnaire-based web survey in the University of Perugia. The questionnaire has been dispatched to 350 students. The age of the students ranges from 19 to 25 years. All the students participated to the survey voluntarily.
The role of local engagement in delivering city logistics innovations

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The work provides an overview on engagement approaches tested and performed in different urban contexts, in order to foster stakeholder participation to the debate on urban freight, and on methods to identify commons solutions and develop viable models.

The analysis considers the experience of cities where initiatives related with urban freight deliveries are being planned and implemented, and where local engagement strategies have been put in place in order to identify issues and common viable and accepted solutions.

In particular, innovative cases have been considered where policy, technology, infrastructure and operational solutions have been trialed and in most cases combined in order to deliver innovative concepts. The tests of new solutions are analysed according to a common framework of indicators taking into account different approaches and strategies put in place in order to foster behavioral change and ensure social acceptance of innovations in city logistics through a participative process. Taking advantage of the experience of the Smartfusion (Smart Urban Freight Solutions, funded by the European Commission, Seventh Framework Programme) and Smartset (Sustainable Market Driven Terminal Solutions for Efficient freight Transport, co-funded by the Intelligent Energy – Europe II Programme) projects, nine case studies across Europe related to city logistics are analysed, looking at the adopted approach in order to raise awareness, identify problems and build viable solutions combining collaborative engagement strategies and business modelling techniques. Engagement measures are taken into account, such as the application of the Design and Monitoring Framework methodology, establishing of “freight committees” involving city stakeholders, development of contractual schemes on commercial basis among others. Figures and outcomes generated by a broad range of instruments such as workshops, focus groups, questionnaires and interviews are processed and analysed. The cross city and country approach allows to identify drivers and conditions to behavioural change, and to define common methodologies for raising awareness strategies to be performed at local level in order to successfully deliver innovation in city logistics. Although different models have been chosen to approach a wide range of issues related to urban freight delivery, the analysis of case studies allows to define a common set of guidelines and recommendations in order to put in place effective synergies for stakeholders engagement fostering active participation and behavioral change towards more cooperative approaches. This paper participate to the development of new city logistics management techniques and will contribute to deliver high impact institutional, operational and technological innovation in urban freight delivery schemes.
ZED – (Zero Emissions Distribution) is intended to implement a new logistics model at zero emissions (CO2), with a break-even energy balance and economic savings prospects for the distribution of FMCG – Fast Moving Consumer Goods (beverage) and perfumes and luxury goods, within large metropolitan areas and LTZ (Limited Traffic Zones) of Rome through the integrated use of renewable energy sources and innovative technologies that use solar energy (photovoltaic modules) to supply power for electrical vehicles through fast charging towers. In the historic inner-city area of Rome 25,000 vehicles are operating daily; 60% of those vehicles (15,000) generate 35,000 loading/unloading activities, while the remaining 40% cross the inner-city area without stopping (*Valeri e Stathopoulos 2010); this represents one of the major causes of pollution and ZED wants to solve this problem through a technological approach. Project summary: Deliver more than 1,000 shipments per day in the LTZ zones of Rome by a warehouse located at 15 km from the city center (GRA - Tiburtina area) by n. 8 electric vehicles. The electric vehicles (2.5 t of payload and 60 kWh) will have an autonomy of 140 km and the possibility to exceed slopes greater than 21%. The electric vehicles will be able to deliver in the LTZ even 2 times/day. The warehouse will be covered by 1,500 square meters of photovoltaic panels and it will supply energy (DC) to 8 electric vehicles and to some fast-charging towers. The management model ZED will be supported by a dashboard, capable of: a) continuously monitor the energy balance of the system (the warehouse and vehicles); b) optimize the distribution activity, planning and monitoring the activities of electric vehicles. In October 2014, the first electric vehicle started the distribution service in the historic center of Rome (ZTL), the second started in March 2015, while the whole fleet (6-8) will be deployed in full operation in May 2015. Main Partners: Mancinelli Due (www.mancinellitraesporti.it), BIP – Best Ideas & Projects (www.bip-bestideasprojects.it), POMOS (www.pomos.it), CNR (www.cnr.it), ACT OPERATION RESEARCH (www.act-operationsresearch.com)

Focus Research
- HUBs and TPs powered by photovoltaic energy panels: recovery/energy savings with the elimination of losses due to the absorption of the inverters in double conversion between direct and alternating current (DC –AC) and vice versa for battery recharging;
- Fast-charging electric vehicles charging station for electric vehicles (goal 30-40 minutes);
- Electric vehicles with energy recovery through advanced braking systems and piezoelectric harvesting (range extension 160-180 km);
- “Smart” dashboard for monitoring the entire logistics-distribution model;
- Stations for quick replacement of batteries for electric vehicles (TBD).
Climate change consequences due to CO₂ emissions are one of the main externalities related to freight transport. The constant increase of their level is in countertrend with all the civil sectors. Most of the recent European strategies are trying to adopt adequate measures to address this critical condition, without limiting freight circulation. Some of such measures are related to the efficiency of the vehicles and to the introduction of alternative fuels. Others focus more on the political measures, aiming at a modal shift towards less polluting transport systems. This can be obtained both through the adoption of bans and higher taxation, and through the increase of attractiveness of less polluting systems (e.g., improvement of existing railway lines and multimodal centers, realization of high capacity railways).

Normally, only the tank-to-wheel phase is considered for the evaluation of CO₂ effectiveness of these measures, thus underestimating their potential. This paper describes a methodology to develop a complete well-to-wheel analysis, able to forecast the real impacts of freight transport and its economic evaluation under different political and technological assumptions.

A case study along a main transalpine corridor is then presented, where the issue is particularly relevant due to the quantity of freights transported and the territorial geomorphological conditions (in mountain areas, CO₂ emissions can be up to five time higher than in plain, according to the gradient). The case study gives concrete results in terms of possible economic savings deriving from the reduction of CO₂ emissions, showing the difference with tank-to-wheel analysis and constituting a valid tool for the development of a freight strategy in line with European and National trends.
ID 104: Latent Markov multinomial logit regression for discrete choice data: implications for willingness to pay for alternative urban freight policies

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Discrete choice models are commonly used in behavioural freight modelling to estimate willingness to pay (WTP) for specific attributes such as number of loading and unloading bays, probability of finding them free, etc. (e.g. Gatta and Marcucci, 2014; Marcucci et al., 2015). While choice modelling develops, it also makes available a growing set of models with progressively higher degrees of behavioural richness. This can be testified and illustrated by the progression from multinomial logit, nested logit, cross-correlated nested logit and mixed logit. At the same time the request for more realism, greater behavioural relatedness, higher parameter accuracy and credibility is not over and analysts are exploring alternative methodological approaches to parameter estimates.

More precisely, multinomial logit regression provides a general framework for the statistical analysis of discrete choice data. Under this setting, the influence of the covariates on the outcomes is assumed constant across subjects and along time. The available covariates, however, often explain only a portion of outcome variability. As a result, subject-specific random effects are typically used to account for unobserved heterogeneity across individuals. Mixed-effects multinomial logit models, including both fixed and random effects, can account for this source of latent heterogeneity. However, under this setting, the influence of the covariates is only allowed to vary across subjects. A limitation of this approach is that both fixed and random effects are assumed time-constant. This assumption can be too restrictive in specific situations, especially when dealing with stated preference data when repeated choices are made by the same subject. A second limitation pertaining to mixed-effects multinomial logit models relates to the need to specify a priori the parametric distribution of the random effects. This last point might have strong implications for parameters estimates since a mis-specified random effects distribution can seriously bias the whole analysis.

The paper adopts a hidden Markov approach to extend the multinomial logit specification so to overcome the limitations discussed above. Precisely, the regression coefficients of a multinomial logit model is assumed to vary across subjects and along time, according to a hidden Markov chain that emulates the dynamic effects of latent variables on the repeated choices behaviour of the subject. This allows for the estimation of the time-varying effects of the covariates without assuming a specific parametric distribution of the random effects. The paper also describes an efficient expectation-maximization algorithm to obtain maximum likelihood estimates and a computationally inexpensive routine to calculate bootstrap standard errors. Methods of model selection and outcome prediction are finally discussed. The paper compares the results obtained under the proposed model with those found by a standard multinomial logit regression with random effects. This study demonstrates that the latent Markov approach flexibly accommodates for time-varying latent heterogeneity, avoiding possible specification errors due to erroneous distributional assumptions on the random effects. These results are particularly important for behavioural research in urban freight transportation. In these studies, questionnaires with a substantial number of choice exercises are popular, due to the lack of participation and high cost of each interview. It is common practice to administer a considerable number of choice exercises to each interviewee. Given this context it seems not only appropriate but also needed to test for time varying effects of latent variables that have a longer time for manifesting themselves. The paper will help understand the behavioural implications of the questionnaire administration procedures adopted and unveil the likely biased results ascribable to the commonly adopted data treatment while discussing their possible implications for the willingness to pay for alternative urban freight policies.
Nowadays European cities are growing more and more and the increase in urbanization is strictly related to the increase in motorization. Also, the socio-economic development of cities is strongly related to freight distribution. However the not-sustainability of urban freight transport represents a major cost in economic, social and environmental terms. A sustainable urban development can be achieved by applying city logistics measures which provide more efficient and environmentally friendly urban freight transport systems by, at the same time, conciliating the different interests of the stakeholders involved in the complex urban system. In this context, Urban Freight Consolidation Centres (UFCCs) represent a good tool to reduce negative impacts related to urban freight distribution (Anderson, Allen, and Browne 2005). In fact, by using high-load shared delivery vehicles for the last mile, UFCCs allow reducing congestion and pollution related to heavy vehicles (HGVs) in urban areas. Even though best practice and policies of urban sustainability are strongly promoted by the European commission, sustainable urban freight policies are difficult to implement; in fact, initial funding from the central or local government is necessary for feasibility studies and trials when the UFCC project starts. (Browne, Sweet, Woodburn and Allen, 2005). Furthermore, often stakeholders involved in city logistics process do not know city logistics measures and they are not aware of the benefits these schemes can provide (Stathopoulos, Valeri and Marcucci, 2012). Also, local authorities are not very conscious about the acceptability and the operative constraints related to the potential users of the scheme which are those that determine the success of the scheme because they provide for its financial sustainability. For this reason, the lack of awareness and the financial issues discourage local authorities from rely on these scheme. A deep behavioural change in all the stakeholders involved is needed. The paper presents findings from a survey carried out in the city of Cagliari (Italy). The survey aims to investigate on the stakeholders’ freight urban transport habit in order to evaluate the possibility of their behavioral change and involvement to implement a sustainable urban freight distribution scheme. A multi-stakeholders approach has been developed by involving the retailers operating in a specific commercial limited traffic zone of the city centre with the purpose to understand the perspective of the potential users involved about innovative urban freight systems policies. The survey can represent the basis on which policy-makers can understand the acceptability of city logistics measure, above all UFCCs schemes respect to the potential users of the UFFC; so, they can decide if, when and how a city logistics measure can be implemented in the city centre of Cagliari to make it more sustainable. Cagliari is the capital of the Sardinia island. Its city centre is full of bars, restaurants and hotels that work hard on Summer due to the high tourists affluence in this season. The survey has been carried out by identifying a specific commercial area of the city centre. The area identified is a limited traffic zone located characterized by a high number of commercial activities related to the Ho.Re.Ca. sector. This kind of sector is quite exigent in terms of deliveries due to the fresh and perishable nature of the products they use for their business; a typical delivery is a small size delivery with high frequency, so this sector generates a high number of journeys in low load. For this reason the authors decided to identifying an area in which these activities were prevalent, in order to investigate if, and how, city logistics schemes could conciliate with their delivery needs. The population considered for the survey is composed by 60 commercial operators (about 50% of Ho.Re.Ca. activities located in that area), which can be splitted approximately in equal parts in bar, restaurants, discount markets and hotels. Data collection process has been carried out in 2015 during the months of February and March by means of questionnaires administration and face-to-face interviews. Two kind of questionnaires have been designed: a shorter one and a longer one depending of the availability of the interviewees.
Over the past two years three developments have been portrayed as possibly revolutionising the movement of freight in urban areas. Mass adoption of additive manufacturing would allow people to 3D print consumer products in their homes, confining ‘last mile’ delivery to the infrequent, bulk movement of the filaments needed for the printing process. This could fundamentally transform order-fulfilment, substantially reducing freight transport intensity in urban areas (Waller and Fawcett, 2014). The delivery of some of the products still manufactured elsewhere could take to the air and exploit recent advances in drone technology (DHL, 2014). The distribution of packages by drone is already happening in some Chinese cities, though is still subject to tight restrictions in many other developed countries. The surface delivery of goods in urban areas might also undergo a radical change if the crowd-sourcing of parcel delivery becomes widespread (Botsman, 2014). The use of social networking and online taxi networks, such as UBER, to support this practice of ‘crowdshipping’ is already beginning to redefine the interface between personal and freight movement in urban areas. All three of these innovations have generated a great deal of publicity, but few attempts have yet been made to assess their likely impact on logistics operations in towns and cities. Some scepticism has, nevertheless, been expressed about their likely impact. For example, in 2013, the US consultancy company Gartner (2013) reckoned that ‘consumer 3D printing’ was at the ‘peak of over-inflated expectations’ on its so-called hype-cycle. Distribution by drone has also been dismissed as an Amazon publicity stunt ahead of the 2013 US Thanksgiving shopping spree (Wohlsen, 2013). Meanwhile the Inspector General of the US Postal Service (2014) has cast doubt on the practicality and security aspects of crowdshipping. This paper will review evidence on the likely scaleability of these innovations and their possible effects on freight movement in urban areas. The evidence to be presented in this paper will come from secondary sources and discussions with numerous experts. Academic literature is beginning to appear on the possible supply chain implications of 3D printing, though reference to its effects on city logistics is still scant. As distribution by drone and crowdshipping have developed more recently, it is too soon for the results of academic research on these subjects to be published in journals. They have, nevertheless, been discussed in books, magazines and blogs. By combining the available published data on these phenomena with the established principles of logistics system and urban planning, it is possible to speculate about their likely effects on the movement of freight in towns and cities. Corporate 3D printing is now well established in sectors such as aerospace, automotive, construction and medical sciences, but widespread consumer application seems doubtful. For the foreseeable future, the unit costs of domestic ‘fabbing’ will, for the vast majority of consumer products, remain very high by comparison with the economics of batch production in factories. Only those products which can be individualised and for which consumers are prepared to pay a significant ‘customisation’ premium are likely to 3D printed in large quantities in people’s homes (McKinnon and Whiteing, 2015). Collectively they are likely to represent a relatively small proportion of all the material goods delivered to the home. An intermediate form of additive manufacturing may develop in urban areas where the printing is done more economically and with greater sophistication on a larger-scale in local ‘fab shops’ (Janssen et al, 2014). These might either be dedicated facilities or part of new multi-functional premises combining fabbing with conventional retailing, collection of online orders and possibly a range of other logistical activities. It is likely that in most countries the use of unmanned aerial vehicles (i.e. drones) for the delivery of parcels will continue to be subject to tight government controls. Even if these controls were relaxed, distribution by drone would probably be a niche service, given its high unit costs and numerous operational constraints. Drones carry one order at a time as opposed to a home delivery van which can typically deliver around 120 non-food items in an 8 hour shift. Assuming one round trip per hour, including loading and unloading, a drone would distribute only 6% of that number. At a ratio of around 16 drones to one van, delivery costs would be relatively high (McKinnon, 2015). It would also require mass use of drones to achieve even marginal reductions in traffic congestion and emissions, something that regulatory authorities would be unlikely to approve.
We introduced the tactical planning problem for City Logistics systems when demand uncertainty is explicitly considered, focusing on the general, and more complex, two-tier City Logistics setting. At the best of our knowledge, no previous contribution in the literature addresses uncertainty issues in tactical planning for City Logistics. Several concepts have been introduced and projects have been undertaken in recent years to reduce the negative impact of freight-vehicle movements on city-living conditions, particularly in terms of congestion/mobility and environmental impacts, while continuing to support its social and economic activities. The fundamental idea that underlies most initiatives is to consider shipments, firms, and vehicles (as well as the other stakeholders in a city’s transportation system) not individually but rather as components of an integrated logistics system. Such a view emphasizes the need for an optimized consolidation of loads of different shippers and carriers within the same vehicles and for the coordination of the resulting freight transportation activities within the city. Similarly to any complex consolidation-based transportation system, City Logistics systems require planning at strategic, tactic, and operational levels [1,4].

We focus on tactical planning because of its central role in the overall planning process and management of consolidation-based transportation systems to which a 2T-CL system belongs. Tactical planning selects the services and schedules to run, assigns resources, and defines broad policies on how to route the freight and manage resources. The goal is to provide the means to satisfy demand and operate efficiently with respect to the economic and service-quality objectives of the system, given its overall constraints (layout, resources, operating policies, etc.). Tactical plans thus guide operations and provide the means to efficiently satisfy demand and attain the economic, service-quality, and city-impact objectives of the system.

They are also required to evaluate strategic scenarios and plans (e.g., resource acquisition, modifications to infrastructure, service expansion or contraction, and so on). Planning means a certain level of look-ahead capability and the inclusion of forecast events into today’s decision process. Various sources and types of uncertainty may be defined, from the variability in demand and travel and service times, to accidents and temporary modifications to infrastructure access. In this work, [2] we focus on the uncertainty related to the variation in demand over the horizon of the tactical plan, from a season to a year, variation that is observed and has to be dealt with when the plan is applied day after day during actual operations. The challenge in introducing the explicit consideration of uncertainty into tactical planning for City Logistics therefore is not only building an appropriate mathematical formulation of the problem, but also understanding the impact on the management and performance. This paper is a first answer to this double challenge. We thus gave a first formal description of the problem describing several possible strategies to adapt the plan to the observed demand, and experimentally evaluated and compared these strategies not only in terms of “costs”, but also in terms of impact of transported freight in the city (e.g., number of vehicles and their utilization in terms of loading factors and empty movements) and insights into the management process. We proposed a two-stage stochastic-programming model, where the first stage selects the first-tier service network design and the general workloads of the inter-tier transfer facilities, while the second stage determines the actual vehicle routing on the second tier as well as some limited adjustments of the first-stage service design decisions. Four different recourse strategies and formulations were proposed to adapt the plan to the observed demand. These strategies were experimentally compared through an evaluation procedure that, based on Monte Carlo principles, aimed to mimic the decision process of a priori planning, followed by the repetitive application of the adjusted plan for the periods of the planning horizon.

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This paper presents preliminary results of the iNEXT (Innovation for Energy and eXchange in Transportation) project (Smart Cities Italian national project). Within iNEXT CNR TAE Institute is involved in infrastructure, logistic and vehicles development with the aim to reduce the impact of transportation on the cities and touristic areas. iNEXT aims to support innovation in the field related to road transport and energy demand of buildings. Particularly, the first field promotes the use of ecological vehicles in passenger transport and freight distribution considering the energy production from renewable sources (RES). At the same time the project will address the development of production plants from RES with advanced electrochemical storage systems and hydrogen production/storage able to interface the electric/hybrid vehicles under control of an ICT platform.

The freight distribution considers the use of an Urban Distribution Centre (UDC) and the optimization of the vehicle routes. The goal is twofold: the UDC allows reducing the number of freight vehicles in the downtown, the route optimization allows to minimize the energy consumption by the vehicles. The paper discuss the elements of models and algorithms to solve the Vehicle Routing Problem (VRP) for city logistics. A real case application is reported. The freight distribution in an urban area is defined as the process for optimizing the logistics and transport activities considering the traffic conditions, congestion issues and combustible (or energy) consumption, with the aim to reduce the number of vehicles optimizing its operations (Taniguchi et al., 1999). Two optimization levels are considered in this work: first, the use of an UDC to consolidate the freight and reduce the number of heavy vehicles in the city; second the route optimization of a fleet of light electric vehicles to minimize the energy consumption. An Urban Distribution Centre (UDC) is a component of a multi-level distribution scheme implemented in several cities to reduce the impacts of freight distribution in urban areas (Cattaruzza et al., 2015). A Multi-level distribution considers that the freight is collected and stored in the UDC and hence delivered to users (i.e. retailers).

This problem can be formulated as a VRP in which is introduced the use of electric vehicles and the energy minimization defining an Electric Vehicles - Vehicle Routing Problem (EV-VRP). The assumptions are that the energy consumption depend on the vehicle travelled distance (is not considered the vehicle load). The EV considered in this work is a new concept delivery van, designed to optimize the energy use and characterized by innovative features as a new type of rolling chassis, a different upper body solutions, high payload and a lifting platform. The urban freight distribution is affected, in several cases, by temporal constraints (i.e. the delivery operations can be made only in time windows established in advance). To take this into account, it is proposed a EV-VRP with Time Windows (EV-VRPTW) as follows. Being $G(\mathbf{N}, \mathbf{L})$ a graph schematizing the road supply, with $\mathbf{N}$ the set of users and $\mathbf{L}$ the set of links. Moreover, being $\mathbf{Z} \subseteq \mathbf{N}$ a subset of $\mathbf{N}$ containing the users and the UDC. The problem is formulated as a minimum problem respect to a variable vector $\mathbf{X}$. 

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Urban freight transport plays a fundamental role in the sustainable development of urban regions, but it has several negative external effects that threaten the livability of cities such as pollution, traffic accidents, noise, and traffic congestion (Van Binsbergen and Visser, 2001). In recent years urban consolidation centers (UCCs), facilities where goods from large trucks can be dropped off, sorted and consolidated in smaller vehicles targeted for the inner city distribution, have been proposed to reduce the negative impacts of urban freight movements.

To date, a large amount of research has been conducted to design efficient and sustainable configurations of urban distribution systems by identifying the best location of these facilities (Crainic et al., 2004; Munuzuri et al., 2012), the optimal fleet choice for the last-mile delivery (Figliozzi et al., 2011), and the viable institutional tools (public-private partnerships, subsidies, etc.) to boost the adoption of these measures (Browne et al., 2005; Allen et al., 2012). Despite the considerable number of studies, in reality only few of the UCCs projects implemented so far have been successful and these successful projects are currently operational.

The majority of real-world experiences is characterized by a lack of a scientific and comprehensive approach in the evaluation of options like the location of UCCs, the typology of vehicles used for last-mile deliveries and the most efficient routes for deliveries. Together with issues concerning the organizational-setup (support by local authorities by means of subsidies), these represent crucial conditions to be considered during the preliminary investigations.

Since we deem it important to identify an efficient configuration in terms of location of facilities, characteristics of the distribution fleet, and the optimal routes to accomplish the deliveries, we develop a user-friendly “toolbox” to do that. In particular, we propose a model to solve a “location-routing problem” combined with a “fleet choice problem” based on the heuristic genetic algorithms. In addition, we include in the toolbox the possibility to adopt different objectives, such as minimizing delivery costs or environmental impacts, in order to investigate the different perspectives of the actors’ involved in the urban freight distribution process (e.g. retailers, local authorities). The applicability of the toolbox is demonstrated using a realistic scenario representing the city center of Austin, Texas.
ID 111: The object of organizational robustness and resilience: an content analysis

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The aim of this article is to explore the concepts of robustness and resilience in organizations and is principally concerned to research question "What are the central theories and concepts about the terms robustness and resilience in Transport Logistics?". The main objectives of this article are exploring and describing qualitatively the terms of organizational robustness and resilience, their interrelations and the three most dominant pillars. In case of term robustness, the three most dominant pillars are "Business Practices & Technologies", "Organizational Culture & Agility" and "Risk- & Crisis Management". In case of term resilience, the three most dominant pillars are "Risk- & Crisis Management", "Organizational Culture & Agility" and "Cognitive Capabilities". This article is based on a quantitative literature review of "Robustness and Resilience in Transport Logistics – A Literature Review" written by Florian Maurer and Ulrike Lechner and submitted to the "8th GI Conference on Autonomous Systems". In this literature review the research methodologies of Structured Literature Review (e. g. Lamnek 1995; Hart 2003; Randolph 2009) and Grounded Theory (e. g. Strauss 1996; Glaser 1998) are applied. On basis of used samples (99 scientific papers, chosen from A+, A, B and C rated international scientific journals, proposed by the VHB-JOURQUAL report of the "German Academic Association for Business Research"), in this article we examine systematically generated open-, axial- and selective-codes previously developed via the Grounded Theory approach. Applied methodology for this analysis is the qualitative content analysis (e. g. Schwarz 2000; Mayring 2008). The methodology of content analysis is an evaluation strategy and its purpose is the evaluation of developed or accidental documents without a priori formulated analysis criteria. Aim of this methodology is the controlled traceability of everyday-worldly actions and systematization of patterns. With this article, we deepen scientifically the understanding of the terms of robustness and resilience, structuring / unifying explored objects, and contributing to as well as enhancing existing literature in this field of research. Man-made and natural disruptions as well as cybercrime-events illustrate the high fragility of supply chains networks. For example, a small accident in one part of the supply chain network can cause a major disruption in another part. To guarantee continuous supply of goods and materials, managers of supply chains have to evaluate, strengthen and re-engineer resistant, internally and externally robust and resilient networks. Resilience and robustness are target in transport logistics and supply chain management and can be defined as the capability of a system to manage variations and fluctuations efficiently regardless of the occurrence of disruption. But, due to increasing natural and man-made phenomena, volatility will be the new “normal” (World Economic Forum 2013). Resistance can be determined with the concepts of robustness and resilience: The idea behind robustness is to create undisturbed and strong structures and processes. As Töpfer and Günther (2009) quote, robustness stands for low probability of errors and defaults in service provision and is associated with high reliability of products and services. While robustness stands for stability and constancy, maintaining intact structure and low deviation, resilience is wedded to organizational agility, adaption and change. A combination of both approaches are initial point for innovative organizational structures and new business models strengthen the single organization’s and supply chain’s competitive advantage. The results of this paper are model for the concepts robustness and resilience and their interrelations and the discussion about their main pillars as basis for innovative organizational structures and new business models in volatile business environments. In comparison to resilience, robustness plays a subordinate role and it seems that robustness is more an organizational characteristic instead an organizational capability. However, resilience in organizations and supply chains is an emerging concept and promising future business model. It bases essentially on close relation to risk- and crisis management. Resilience is both, a proactive and reactive extension of risk- and crisis management and incorporates the organizational characteristics of robustness (as proactive part) and agility (as reactive part).
The European Union (EU) is characterised by relevant conurbations playing a central role for its economic development. In fact 85% of the GDP produced in the EU originates from its cities where approximately 359 million of people – 72% of the total EU population – live. The transport sector is accountable for circa 23% of total CO2 emitted and urban logistics produces around 6% of all transport GHG emissions. Cities are both origins and destinations for goods delivery. Transport and logistic-related activities account for 3% to 5% of urban land use. Furthermore the inhabitants of historic city centres, characterising most European cities, suffer from the nuisance originated from freight traffic giving rise to its perception as a local problem. City logistics (CL), as defined by Taniguchi et al. (1999), is “the process for totally optimizing the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy”. CL aims at reducing the congestion caused by freight-related movement, optimising vehicle utilization, and reducing polluting emissions without penalizing social and economic activities within cities (Crainic et al., 2011). Stathopoulos et al. (2012) emphasize that inefficient freight movements also contribute to noise, and increases in logistics costs that often trickle down to final market prices. While freight transport (Lorries > 3.5 tons) constitutes about 10% of total traffic within urban areas (Crainic and Sgalambro, 2009b), Awasthi and Proth (2006) postulate that this percentage is higher when considering delivery vans and cars too. A city with high freight traffic volumes, emissions and pollutants negatively influences socio-economic activities hinders the achievement of a sustainable development. CL operations constitute an extremely flexible type of activity adapting to the on-going deep changes in: urban economy structure, demography, shopping and distribution behaviours, consumers’ and business’ demand. Policymakers have generally considered freight transport matters pertinent to the private sector and have eschewed intervening. Nevertheless given that several market failures are present in CL operations a need for public intervention is evident (e.g. Holguin-Veras et al., 2104). Considering the strong and frequent interactions among the relevant stakeholders one has to accurately account for and deal with the various participants’ point of view. Under this respect developing a proper stakeholder engagement governance model is fundamental. This paper reports and describes the desirable effects obtained by the definition, acceptance and deployment of an innovative governance model introduced in Turin (Italy) where – starting from the successful experience of Freight Quality Partnership (FQP) - an original and well performing stakeholders’ engagement format was developed. Turin’s transport policy is driven by sustainability objectives, as proven by active involvement of the city in several projects aiming to develop efficient urban mobility for both residents and city users. City of Turin prioritized transport policy objectives that can be summarized as follows: 1. increase economic efficiency, 2. ensure road safety and protect the environment, 3. develop local infrastructures and adequately preserve a well-defined urban structure. The collaborative strategies are enablers to create and expand semi-intangible attributes and to optimize the use of intangible attributes of a city. This was achieved by fostering stakeholders’ collaboration along with the efforts made in understanding the dynamic nature of the specific city complexities such as the socio-cultural values of residents, the local administrative and governance policies, as well as shippers’ and freight carriers’ activities. City of Turin has developed a its model in compliancy with EU Transport Committee document "A call to action on urban logistics". In line with the above policy objectives a Recognition Scheme (RS) along with an extensive exploitation of already installed ITS and land use controls were introduced. The recognition scheme is based on full sustainability from environmental (adoption of low emission freight vehicles), economic (achievement of competitive market without public funding) and social (city center accessible for registered operators) side. City of Turin has a long history of sustainable mobility measures implementation having adopted the SUMP in 2008.

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Sustainable Urban Mobility Plans (SUMPs) represent a new tool for city planning fostering effective, coordinated and consistent initiatives in European Member States (MSs) in line with the general guidelines provided by the European Commission (EC). In fact, SUMP, as stated in the EC guidelines, "should build on existing planning practices and take due consideration of integration, participation, and evaluation principles". Indeed, a SUMP constitutes a comprehensive framework including present plans and provides a clear vision and reachable targets. Given its inherently strategic nature, it can, de facto, display substantially different forms and characteristics in each Member State. This work assesses the effective adoption of the most innovative SUMPs' principles in the different national frameworks, through a systematic comparative analysis of five key criteria.

The paper adopts a comparative approach in the analysis of the countries considered, when investigating urban planning instruments developed by national legislation and guidelines. The comparison performed is based on five, distinguishable and measurable, criteria: i) participation (stakeholders and citizens engagement), ii) policies' coordination and integration, iii) monitoring and evaluation tools, iv) long-term and sustainable vision, v) specific provisions for freight transport. In section one, the paper describes the present challenges of urban mobility policies and the Commission's long-term strategy. Section two describes SUMP and comments it with respect to its main objectives and measure-types. Section three identifies the tools adopted by twenty-one MSs so to promote their sustainable urban planning, among all those currently put in place with specific reference to the urban transport sector. Section three also provides a literature of SUMPs' principles: participation, integration, strategy and evaluation, and urban freight planning.

Section four analyses these plans by checking for the presence of the previously selected criteria, representing the minimum requirements for SUMPs to be considered effective by the EC. The paper investigates whether the nationally available strategic planning tools, implemented before and after the publication of EC guidelines, can be considered coherent and well grounded EU principles.

The research shows in section five that only few measures put forward in SUMP's guidelines have been formally implemented in MSs procedures, and suggests that a strong effort is still required from the Commission to reach the stated cohesion objectives. Nevertheless, the detailed inspection of the various planning tools indicates a broader understanding of SUMP by the vast majority of EU Members. Moreover, national experts, involved by the EC through its MS Expert Group on Urban Mobility, established in October 2014, are actively contributing to the dissemination of relevant best practices adopted within MSs. The paper systematically individuates the main inefficiencies at local level impeding the implementation of the new solutions envisaged in the SUMP guidelines aimed at effectively address the lack of coordination among MSs policies. The selection of five simple and easily comparable criteria, provides a new tool, useful to properly identify the areas of potential improvement. Future research will analyze the specific sources of these inefficiencies, questioning both the adequacy of the measures adopted at European level and the capacity of directly transferring them to the interested local authorities.
The enhancement of computational resources and capabilities made it possible, in recent past, to estimate complex models to analyze freight behaviours embedded in a micro-economic theoretical framework (Marcucci and Gatta, 2013; 2014; Marcucci et al., 2015). The focus has been centered on random parameters logit models, which allow to reflect individual preferences and taste heterogeneity. The mixing distribution of the random coefficients is supposed to be either continuous, leading to the mixed multinomial logit (MMNL) model (McFadden and Train, 2000; Train,1998; Train, 2003), or discrete, resulting in a latent class (LC) model (Greene and Hensher, 2003). A combination of this two models, a latent class, mixed multinomial logit (LC_MMNL) model has been recently proposed (Bujosa et al., 2010; Greene and Hensher, 2013; Lenk and DeSarbo, 2000). The LC_MMNL model can be interpreted in two different ways: 1) as a LC model which allows for another layer of preference heterogeneity within a class, thus overcoming LC oversimplification of the population real preferences, especially when a small number of classes is defined and the underlying distribution is, in fact, continuous; 2) as a MMNL model in which the problem of choosing an appropriate continuous distribution is solved in a semi-parametric fashion, by substituting it with a flexible mixture of normal densities, overcoming in this way also the inadequacy of the MMNL in the presence of different groups of individuals with different tastes. The LC_MMNL model has been estimated in both a frequentist (Bujosa et al., 2010; Greene and Hensher, 2013) and a Bayesian (Lenk and DeSarbo, 2000; Yang and Allenby 2000) framework. However, an analysis of the strengths and weaknesses of the two approaches is missing. Apart from the phylosophical issues giving rise to the two approaches, frequentist and Bayesian paradigms make use of different estimation and model choice methods. The first approach estimates the parameters of the LC_MMNL model by means of maximum simulated likelihood; the second one, by means of random sampling from parameters posterior distribution. While finding the maximum of a function can be very difficult, sampling from a distribution is generally an easy task. In addition, model choice also differs under the two approaches. In a frequentist setting, for ‘wrong’ models the optimization process generally breaks down and the iterations fail to converge. In a Bayesian setting, any model can be estimated but identifiability doubts may arise. The aim of this work is to investigate the potentialities of the two approaches in the context of LC_MMNL models. The investigation is performed on the basis of simulated data sets. Then, an evaluation on a real data set is also accomplished.
Urban freight transport is crucial for cities. In fact, it ensures high standards of livings and produces significant undesirable social costs. Local policy makers have to promote innovative and effective policies in terms of both environmental and economic sustainability. This is a complex task and its success or failure highly depends on the knowledge of stakeholders’ preferences (Gatta and Marcucci, 2014). The appropriateness and the precision of the results obtained via this behavioral approach is directly related to the sophisticated data acquisition strategy used and the advanced model estimation employed (Marcucci and Gatta, 2013; 2014; Marcucci et al., 2015). The aim of the paper is twofold. The first is to provide empirical evidence on the preferences of stakeholders with respect to policies related to access charging and the supply of loading and unloading bays. An econometric analysis based on the estimation of logit models is carried out. Stated preference data have been collected with the main stakeholders involved (i.e. retailers and transport providers) in the delivery process within the Limited Traffic Zone in the city center of Rome where access restrictions are currently in force (Marcucci et al., 2012). A total of 229 interviews were gathered to accurately estimate the most likely effects of the policy actions investigated. The second is to assess the finite sample properties of the coefficient estimators that are based on the independence across-observations assumption. This assumption is typical in estimation. With stated preference data the assumption is untenable because correlations among random terms across observations by the same individual are likely to exist. Available evidence has focused on the impact of the assumption on the standard errors of the coefficient estimators as well as on the procedures to correct the downwards bias. These include resampling methods such as bootstrapping and jackknife and the sandwich estimator (Cirillo, Daly and Lindveld, 2000; Daly and Hess, 2010). By composite likelihood theory, the estimators based on independent random terms are consistent estimators for the true coefficients if the true model is the one with random terms correlated across observations and identical logit marginal choices (Bhat, 2011). With finite samples, however, one expects coefficient estimates based on independent random terms to be different from those obtained from likelihood based on the true sequence probability. Scant evidence is available on the bias in the finite sample coefficients estimates. Ouwersloot and Rietveld (1996) and Ortúzar et al. (2000) have investigated probit models and made a comparison between independence estimators and minimum distance estimators that take correlation into account. No evidence exists on the bias that might arise in logit models estimated on the basis of real data. The aim of the research reported in the paper is to contribute to fill this gap. The approach used is based on the comparison of the independence estimators with the maximum likelihood estimators of the true model that takes correlation into account. Two models have been proposed in recent literature that provide the probability of a sequence of choice in analytic form. This implies that simulation is not needed for estimation. One model constructs the joint distribution of the random terms across observations on the basis of the Farlie–Gumbel-Morgenstern copula (Bhat and Sener, 2009). This model can take into account low values of the correlation. For binary choices, closed-form, differentiable in the parameters likelihood is available without limitations on the number of observations. Another model is based on the bi-extremal distribution (Delle Site and Salucci, 2015).
Policy-making about urban freight transport (UFT) is a complex task, mainly due to the presence of multiple stakeholders with often diverging interests. Knowing in advance objectives and behavioural aspects related to stakeholders can increase policy-makers' awareness and help them taking better decisions (Taniguchi and Tamagawa, 2005). Besides, direct involvement of all the interested parties in the decision-making process becomes fundamental to find the most shared policy derived from a deliberative and transparent process. In this respect, it has been demonstrated that interaction and deliberation can change stakeholders’ mind about public policy problems (Quick et al., 2014) and lead to a convergence of opinions, moderating strong diverging objectives and pursuing a collective decision (Le Pira et al., 2015). A good design and management of the participation process is crucial for the success of the decision-making process. The aim of this paper is to investigate the inclusive decision-making process about UFT policies involving different stakeholders through an agent-based model. Agent-based modelling is typically used to simulate complex systems, such as social systems, but its use in the field of urban freight transport is quite recent, even though the modelling approach is widely used to reproduce city logistics problems (Anand et al., 2015). Simulations represent a powerful tool in predicting the results of a participation process and giving insights and suggestions on the interaction process, being able to capture emergent phenomena which are difficult to be analytically treated.

The participatory decision-making process in UFT transport is described by means of a multi-layer network, where each layer represents a different level of description and details of the process, and they are interconnected with each other. The new approach of multi-layer networks allows a more realistic and effective representation of complex phenomena (Boccaletti et al., 2014). In the case of socio-economic systems, such as decision-making processes, a particular type of multi-layer network should be used, the so called “multiplex network”, where each node belongs to all the layers but the relationships among them can change within the layers.

The problem of UFT policy-making involving stakeholders is represented as a multiplex network with three layers and the following structure: 1) the bottom layer is the “interaction” level, represented by all the stakeholders linked in networks with the other members of the same category and they can interact with each other; 2) the middle layer is the “negotiation” level, where an agent acts as the spokesperson of its category and it is directly linked with all the other members of the same category; 3) the top layer is the “decision” level, where the spokespeople of the three categories are linked with each other and can interact to find a shared decision.

The simulations are performed within the software environment NetLogo (https://ccl.northwestern.edu/netlogo), particularly suitable for agent-based modelling. Three stakeholder categories are considered in the model, i.e. retailers, transport providers and own-account operators. In order to realistically consider the stakeholders’ behaviour, agents are endowed with utility functions derived from an econometric model, based on a stated preference survey (Stathopoulos et al., 2012). Utility functions are evaluated for each respondent (individual utility function) and for each category (group utility function), being an agent-specific approach (Marcucci and Gatta, 2014).
Sustainable urban freight policies strive to minimize the negative externalities freight distribution produce in densely populated cities. Urban congestion is possibly the most critical issue local authorities have to deal with. It is typically aggravated by the temporal and spatial overlapping of freight related operations with peaking passenger demand. Among the various solutions suggested and implemented, off-peak deliveries (OPD) represent a promising solution with positive impacts on environment, economy and energy consumption. OPD is a form of retiming of deliveries shifting the operations from the regular business hours to the off-hours (e.g. Holguin-Veras et al., 2006). The present behavioral research aims at identifying the most desirable OPD solution in the city center of Rome according to the main stakeholders’ point of view. Previous researches in the same geographical context investigated stakeholders’ preferences for specific parking and pricing related policies through appropriate behavioral models (Gatta and Marcucci, 2014; Marcucci et al., 2015). This paper, instead, focuses on three core issues: (a) understand the OPD awareness and its potential for each stakeholder involved; (b) obtain acceptability and feasibility measures to different types of OPD; (c) assess the overall effectiveness of such OPD initiatives through a stakeholder agreement. The three OPD solutions considered are: i) combined OPD, with urban consolidation centers; ii) assisted OPD, with staff from the receiving establishment present; iii) unassisted OPD, without staff from the receiving establishment (Holguín-Veras and Sanchez-Diaz, 2014). The stakeholders involved in the study are: 1) retailers, who commonly decide delivery times preferring business hours; 2) transport providers, who are generally attracted by the possibility to reduce transportation costs derivable from an increase in the number of deliveries during the off-peak hours; 3) public authorities, who are responsible for carrying out policy interventions for urban freight distribution; 4) citizens, the last but strategically most important link in the value chain, who could be both concerned about noise impacts potentially hampering OPD and willing to pay an extra cost for a “greener” distribution of freight. An interactive multi-actor multi-criteria analysis (IMAMCA) is used to evaluate the different OPD solutions. This technique combines the standard multi-actor multi-criteria analysis (Macharis, 2004) with the stakeholder dialogue (Franceschini and Marletto, 2015). The novelty refers to the deliberative evaluation of the alternative solutions on the basis of the identified strategic goals. Stakeholders’ perceptions are acquired through a combined approach which includes two phases: single in-depth interviews and a focus group. The former consists on extended individual discussions that allow to deeply investigate the knowledge and perceptions of the various OPD solutions (e.g. definition, effectiveness, feasibility, propensity, evaluation criteria). The latter enable collective discussions that facilitate the generation of a “shared vision” on the impact of the alternative OPD options on the strategic goals. The proposed analysis allows to obtain: i) a solid understanding of how OPD solutions are perceived by the various stakeholders; ii) useful information identifying strengths and weaknesses for each alternative policies; iii) both individual and agreed evaluation of different OPD options. More in detail, results show that the overall assessment of the alternative OPD solutions achieved through IMAMCA is substantially different from that obtained via a standard multi-criteria analysis. In fact, IMAMCA, accounting for both the bargaining power among stakeholders and their interactive dialogues, allows to attain more robust and appropriate findings. The results provide notable insights concerning the impediments and potential of OPD solutions. All the information produced are strategically relevant and represent the basis for a future implementation of OPD.
The introduction of technological innovation - arising mainly from the ICT sector - in the transport system will lead to a paradigm shift in current trends. The opportunities offered by an increased connectivity are already evident in some behavioural changes in urban population: e-commerce has drastically changed the mobility of both users and freight; increased trip planning by public transport has led to reduced use of private cars; e-medicine, domotics and similar remote control technologies are leading to different mobility needs; fast growing application of 3D-printing will totally disrupt the traditional production plants planning and localization, allowing a largely decentralized, local manufacturing close to consumption locations. It is predictable that present trend of increasing urbanization, urban sprawl and over-motorization will be fully reverted in the near future by the intelligent use of innovative systems. Against high urbanization, a stronger "regionalization" could arise, where smaller autonomous, self-standing centers will be connected in the territory, allowing a much higher quality of life for the citizens, and contrasting the city sprawl with the creation of local communities. Long-range freight transport could be significantly reduced, and urban goods distribution will face a completely new era, becoming lighter, decentralized, customized. Such developments could benefit both the "new urban nomads" generation, and the growing population "keen on time refound". The new cities will be the place for both young productive generation, and the new actively ageing population.

In order to ensure this progress to happen, it will be paramount to have a strong collaboration between policy makers, technology providers and citizens. A strong public acceptance of innovative solutions can be ensured by highlighting the effective benefit brought to the population and an in-depth revision of the modern city planning must be implemented to properly put into effect the new life style induced by innovative technologies, in full respect of the emerging urban humanity, with diverse needs and aspiration for quality of life.

The physical infrastructure plays a fundamental role, and it must be recognized that the present structure doesn't any longer fulfill the requirements of future people and freight mobility. A number of experimental developments can be analyzed to assess how the innovative city design has induced a change in behavioural aspects in the citizens.
This presentation gives an overview of the urban logistics policy and initiatives within the Flemish region. Specific focus will be on the two pilots on off-hour deliveries that have been carried out since 2011 in Flanders. Flanders is an urbanized region and a logistical turntable in Europe. Hence urban freight is considered as an important levy for the (economical) liveability of its cities and the efficiency of supply chains. The political level therefore acknowledges the importance of urban freight. The policy memorandum ‘Mobility and Public Works (2014-2019)’ foresees the development of a regional policy framework on urban freight which has to give guidance to local authorities and stakeholders in developing a stimulating environment for urban logistics solutions. Off-hour deliveries, urban consolidation centers and multimodal solutions (inland navigation and cycle logistics) are an integral part of this broader framework. Data are also seen as a key enabler for policy monitoring and the development of new solutions. The region has already undertaken several initiatives that could be considered as building blocks of the forthcoming framework and further future actions.

- Flanders has done extensive work (2 ‘PIEK’ pilot projects) on off-hour (early morning and late evening) deliveries for big food retailers. The pilots enhanced the knowhow on the noise aspects of off-hour deliveries, the economic and societal costs and benefits, the safety aspects and the support of stakeholders (companies, inhabitants, drivers,…) for this solution. Guidebooks for local authorities and retailers facilitate the implementation of the measure.

- The results of these projects lead to a proposal to change the legal environmental framework in order to enable off-hour deliveries to big retailers. The modification is currently about to be adapted by the Flemish government.

- The region also enhanced the local dialogue and co-operation on city logistics through the support of local stakeholder platforms in six Flemish cities. This enriched the local urban freight policies, strengthened co-operation amongst stakeholders and resulted in a guidebook for local authorities to develop their own dialogue. Through the organization of thematic sessions, knowledge and best practice were shared with local authorities.

Furthermore:

- Flanders invests in state-of-the-art (demand-driven) research.

- The region recently carried out a preliminary study on data collection. This document gives insight in which data are available and which are to be gathered. The study will be an instigator for further actions in data gathering, also leading to traffic management and ITS-solutions.

- European policy and projects are closely monitored. European policy measures are integrated in the regional policy and financing opportunities are communicated to the stakeholders. As an observer in European projects (e.g. LaMilo, Cycle Logistics Ahead) the region contributes to sustainable solutions for urban freight.

- The use of inland navigation for urban freight is also gaining ground

Within Flanders many stakeholders (companies, public authorities, citizens, knowledge institutions…) contribute to more efficient and sustainable urban freight. The urban consolidation center ‘market’ has become very competitive these days. A brief overview of some of these players and initiatives will be given.
ID 121: The NOVELOG project: city cases for efficient urban freight distribution

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The presentation focuses on the NOVELOG project which started in summer 2015 under the coordination of the Centre for Research And Technology Hellas – CERTH and which is funded by the EC within the H2020 Programme. NOVELOG (New cooperative business models and guidance for sustainable city logistics) has a mission to enable the knowledge and understanding of freight distribution and service trips by providing guidance for implementing effective and sustainable policies and measures. NOVELOG focuses on the support to authorities and city logistics public and private stakeholders in the choice of the most optimal and applicable solutions for urban freight and service transport, by developing field testing, collaboration in the supply chain and the transfer of best governance and business models. NOVELOG wants to contribute to the European Commission's research and policy agenda through the generation of sound knowledge that introduces a new approach to guidance strategies that support a more sustainable urban environment. The project involves 12 city cases in Athens, Turin, Graz, Rome, Barcelona, Mechelen, Emilia-Romagna Region, Gothenburg, Venice, Copenhagen, Pisa, London Borough of Barking and Dagenham, covering a wide range of city logistics measures. An extended network of 91 bodies at global level supports the project. The presentation, further than giving a snapshot of NOVELOG, enters into some recent experiments on city logistics of Emilia-Romagna Region (Italy), including the regional harmonization of rules of access to LTZs which will be followed up in the same NOVELOG project.
Goods, waste and service trips in urban areas impose negative traffic and environmental impacts, and there is a need for further roll-out of cost-effective and sustainable solutions. CITYLAB is an EU-funded H2020 project. The objective is to develop knowledge and solutions that result in roll-out, up-scaling and further implementation of cost-effective strategies, measures and tools for emission free city logistics in urban centres by 2030.

CITYLAB will i) improve basic knowledge and understanding on areas of freight distribution and service trips in urban areas that have received too little attention; ii) test and implement 7 innovative solutions that are promising in terms of impact on traffic, externalities and business profitability and have a high potential for future growth; and iii) provide a platform for replication and spreading supported solutions. The core of CITYLAB is a set of living laboratories, where cities work as contexts for innovation and implementation processes for public and private measures contributing to increased efficiency and sustainable urban logistics. Linkages will be established between the different living labs for exchange of experiences and to develop methodologies for transfer of implementations between cities and between companies. This process will be supported by a strong research team. The outputs from the living labs will include best practice guidance on innovative approaches and how to replicate them. CITYLAB will lay the ground for roll-out, up-scaling and transfer of cost-effective policies and implementations that lead to increased load factors and reduced vehicle movements of freight and service trips in urban areas. CITYLAB will create the context needed to reach this objective by deploying a set of living laboratories (‘living labs’) where cities and regions will work as dynamic and real life contexts for research, innovation and implementation processes for both public and private measures contributing to more efficient and sustainable urban logistics. Currently, the field of city logistics is characterized by many small scale demonstrations. Barriers for large scale implementations of these demonstrations are often transferability, knowledge of business cases and involvement of the right stakeholders. A living lab differs from conventional demonstrations in that it creates an experimentation environment in which stakeholders aim at achieving a long term goal together. How to get there is not yet defined exactly, but the goal is shared among all stakeholders, including the citizens, government, industry and research. The living labs enable user-centric research for sensing, prototyping, validating and refining solutions in a dynamic real-life context. The set of activities, performed in a living lab context involving public, private and research partners, will stimulate a co-creation process that will most likely produce not only ex-ante acceptable policies but also ex-post higher achievement of results.

The project focuses on four axes that call for improvement and intervention:

- Highly fragmented last-mile deliveries in city centres;
- Inefficient deliveries to large freight attractors and public administrations;
- Urban waste, return trips and recycling;
- Logistics sprawl

Within these axes CITYLAB supports implementations that will be tested, evaluated and rolled out. The implementations deal with new distribution hub concepts and clean vehicles, a floating depot, initiatives for utilising free van capacity, consolidation of deliveries to large public institutions and shopping centres, integration of direct and reverse logistics, and logistics hotels aimed at counter-balancing logistics sprawl. The seven CITYLAB living labs are Brussels, London, Oslo, Paris, Rome, Rotterdam, and Southampton, and the implementations will take place in these cities. However, dedicated actions will be made to involve additional cities across Europe, and transferability of solutions to other cities will be supported.
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