

# Decision Support System For Integrated Door-To-Door Delivery: Planning and Control in Logistic Chains

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## Special Focus

**MOSCA-SUSTAIN**

### Dear Reader,

MOSCA has formally come to an end in June 2003.

The objectives have been identified by establishing synergy, sharing of technologies and services among stakeholders.

The MOSCA methodology and software solutions can favour the meeting of the city administrations (information suppliers) with the freight logistic operators (information users).

Thanks to the involvement of user groups, including both city administrations from different European cities and selected logistic operators, the proposed methodology has been examined and approved for further development.

I take this opportunity to thank all who have taken part in the MOSCA User Forum for the continued support

Yours,

The MOSCA Project Manager



Paola Cossu—FIT Consulting srl

## 1. New approaches for a sustainable Urban Freight Transport

The Final Conference of the EU Project MOSCA (Decision Support System for Integrated Door-to-Door Delivery: Planning and Control in Logistic Chains) – co-funded by the European Commission INFSO - took place in Dresden (Germany) the 16<sup>th</sup> June 2003.

It was stressed the importance of MOSCA system as “facilitator” for integrating different and (often) opposite needs of City Administrations and Operators (e.g. shipping/forwarding companies) since the MOSCA project objective is to improve the management of logistic process promoting a mutual exchange of information between logistic operators and city.

## 2. The MOSCA Final Conference



It was underlined that in most European cities the Central Business Districts are emptying out of citizens and heavy industries, while the concentration of commercial activities (the tertiary sector) is constantly increasing.

People prefer to live out of the city, going downtown for business and shopping.

Traffic increases and less people use public transport, which is often insufficient in suburban areas.

Figure 1: The Final Conference in Dresden (1)

There is room to study, develop and implement new models, new algorithms, new organizational arrangements in logistics. It is fundamental to involve local authorities in the process along with operators (tables of discussion).

Furthermore, software developers have to address open platforms and not proprietary solutions (e.g. a proper middleware to import-export from other platform is required).

It was demonstrated that there are clear benefits to implement the MOSCA vision and such savings can be estimated for different sites.



Figure 2: The Final Conference in Dresden (2)



**LUGANO (Switzerland)**

The modules implemented and tested in Lugano are MOSCA-SHOP, MOSCA-SHORT and MOSCA-LINE.

In MOSCA-SHORT the road network of Lugano with interval travel times for each road is already available. The tests foresee the comparison of paths for some given pairs (*origin, destination*): the robust path versus the shortest path on the lowly loaded traffic network respectively on the highly loaded traffic network.

In MOSCA-LINE data on deliveries are provided by a fuel distribution company located nearby Lugano. In addition the road network of Lugano including interval travel times for each road is available.

The MOSCA-LINE architecture works by dividing the working day into time-slices, and new orders received during a time-slice are postponed until the end of it. In such a way the dynamic problem is decomposed into a sequence of static problems. As a result new incoming orders could now be handled immediately by the dispatcher and the drivers.



Figure 6: MOSCA-SHORT test in Lugano

**MOSCA-SHORT**

*“Calculation of convenient paths between two points in the case of a dynamic urban traffic network in the situation where travel times along the network arcs are not known in advance with certainty”*

**MOSCA-LINE**

*“Re-planning of vehicle tours in presence of unexpected events such as new customer requests or traffic jams”*

In MOSCA-SHOP all information on the parking spaces in Lugano are integrated into a data base and are now available via Internet. The integration of all kinds of data related to goods transport vehicles is an important advantage of this system. Booking of parking spaces is possible in advance also for transport operators with special requirements.

**MOSCA-SHOP**

*“Integration of loading and unloading time windows of shops in an open Internet platform where slots can be booked by transport operators”*



Figure 7: MOSCA-SHOP – Reservation of parking spaces in Lugano

**PADOVA (Italy)**

The Padova municipality has a general traffic model to work on planning problems. The assignment model is developed only for the traffic peak hour. For the testing of MOSCA-TOUR an estimation of travel times over 24 hours for all links of the graph is done. In several scenarios data sets of several customers are used. For each test problem (scenario) five runs of the non-time dependent model and five runs of the time-dependent model are conducted. The performance in this model is measured in total travel time. Statistical tests show that in average the improvement of the solutions is 6.42% which means a reduction of the total travel times for the transport companies.

**MOSCA-TOUR**

*“Planning of delivery operations for a given set of customer data, a given fleet of trucks with fixed capacity and given road network conditions - Time dependent vehicle routing problem”*

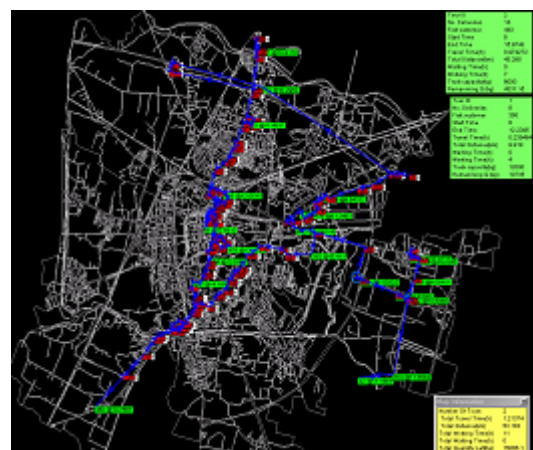


Figure 8: MOSCA-TOUR - solution for 22 customers

# MOSCA-SUSTAIN “assessing noise reduction measures in a monetary way”

Cities suffer from environmental problems that are mainly caused by private and freight transport traffic. Noise, air pollution and vibrations are three examples out of a long list of negative impacts of motorised traffic, which lead to nuisance and damage of property and human health. MOSCA-SUSTAIN is a sustainability assessment module for the municipal traffic. It focuses on the noise-problem as a specific environmental problem for cities. MOSCA-SUSTAIN consequently allows the analysis of noise impacts for the inhabitants as well as the assessment in monetary values. The cost effectiveness of noise reduction measures can be estimated and analysed by the depiction of environmental costs. The sustainable assessment of measures, which refers exclusively to the freight traffic, can be judged as well as similar measures that affect the commuter traffic, respectively the total traffic. Noise reduction measures (e.g. detours affecting other network parts) can cause network effects in urban areas. The method takes these vehicles and network-specific properties of the various reduction measures into account when assessing their effect on social welfare. For cities several traffic and noise reduction scenarios can be developed and subsequently assessed with health-, property- and detour-costs. Noise reduction measures show benefit for the economy as a whole as well as selected industries. These benefits can be documented in monetary figures. MOSCA-SUSTAIN fulfils requirements of the new EC noise Directive (2002/49/EC: in July 2002 published in the Official Journal of the European Communities and thus entered into force). The aim of this EC-directive is to define a common approach for all member states to avoid, prevent or reduce harmful effects, including annoyance, due to the exposure of environmental noise. This new regulation should be the basis for all European governments when developing noise reduction measures. One part of the Directive requires that all cities with more than 250.000 inhabitants have to create strategic noise maps and action plans until midyear 2007 (for cities with more than 100.000 inhabitants until midyear 2012). This part is covered by MOSCA-SUSTAIN.

MOSCA-SUSTAIN is ready for the EC noise Directive 2002/49/EC:

- determination of exposure to noise (strategic noise mapping),
- tool for the information of the public and
- developing of action plans (monetarily assessment of noise reduction measures).



[www.idsia.ch/mosca](http://www.idsia.ch/mosca)  
[www.cordis.lu/ist/projects.htm](http://www.cordis.lu/ist/projects.htm)

### The MOSCA Consortium

- FIT Consulting srl** — Italy ([www.fitconsulting.it](http://www.fitconsulting.it))
- PTV Planung Transport Verkehr AG** — Germany ([www.ptv.de](http://www.ptv.de))
- University of Karlsruhe (TH)** - Germany ([www.iww.uni-karlsruhe.de](http://www.iww.uni-karlsruhe.de), [www.ifl.uni-karlsruhe.de](http://www.ifl.uni-karlsruhe.de))
- Istituto Dalle Molle di Studi sull'Intelligenza Artificiale** — Switzerland ([www.idsia.ch](http://www.idsia.ch))
- University of Cambridge** — United Kingdom ([www.cam.ac.uk](http://www.cam.ac.uk))
- Interporto di Padova spa** — Italy ([www.interportopd.it](http://www.interportopd.it))
- ENEA - Ente per le nuove tecnologie, l'energia e l'ambiente** — Italy ([www.enea.it](http://www.enea.it))
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