

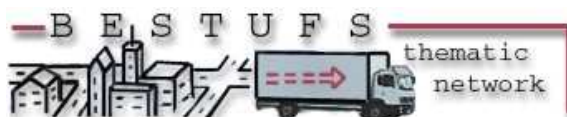
# BESTUFS

## Consolidated Best Practice Handbook

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## TABLE OF CONTENTS

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	The BESTUFS Thematic Network and need for action	1
1.2	Relation to previous and running activities concerning urban freight	3
1.2.1	Global level	3
1.2.2	European level	3
1.2.3	National level	5
1.3	Themes to be treated within BESTUFS	5
1.4	Aims, contents and use of the handbook	6
<b>2</b>	<b>Best Practices</b>	<b>9</b>
<b>3</b>	<b>Statistical data, data acquisition and data analysis regarding urban freight transport</b>	<b>11</b>
3.1	Description of the theme	11
3.2	Situation of data collection on country and city level within Europe	12
3.3	Regarded case studies (project-level)	15
	Example 3.1: Statistics - main data on national level	17
	Example 3.2: Statistics - main data on city level	19
	Example 3.3: Special Survey - Stated preference	20
	Example 3.4: Special Survey - used in only one city	21
	Example 3.5: Special Survey - used in several cities	22
3.4	Conclusions and recommendations	24
<b>4</b>	<b>City access, parking regulations and access time regulations and enforcement support</b>	<b>30</b>
4.1	Description of the theme	30
4.2	Situation concerning City Access on country and city level	32
4.3	Regarded case studies (project-level)	36
	Example 4.1: Barcelona	37
	Example 4.2: Paris	44
	Example 4.3: Copenhagen	45
	Example 4.4: Stockholm	48
	Example 4.5: Amsterdam, Haarlem, Tilburg, Groningen	49
	Example 4.6: Bremen	52
	Example 4.7: Cordoba and Sevilla	55
	Example 4.8: Genoa	60
4.4	Conclusions and recommendations	62
<b>5</b>	<b>E-Commerce and urban freight distribution (home shopping)</b>	<b>66</b>
5.1	Introduction	66
5.2	Situation at country level	71
5.3	Regarded case studies (project-level)	77
	Example 5.1: RelayStar (Benelux and UK)	80
	Example 5.2: PickPoint AG (Germany, Austria, UK)	83

Example 5.3: Internet House (Berlin)	86
Example 5.4: Tower24 (Dortmund)	87
Example 5.5: Magasin de Quartier (Ile-de-France, Paris)	89
Example 5.6: Caddy-Home (Brussels and surroundings)	91
Example 5.7: LeShop (Switzerland)	93
Example 5.8: MIGROS-Shop (Switzerland)	97
Example 5.9: PAD Nanterre (Nanterre)	99
Example 5.10: ServiceLog (Switzerland)	101
5.4 The logistics of online-shopping solutions	103
5.5 Possible effects on urban freight and passenger transport	109
5.6 Conclusions and recommendations	114
5.6.1 Conclusions	114
5.6.2 Recommendations	117
<b>6 Road pricing and urban freight transport</b>	<b>119</b>
6.1 Introduction	119
6.1.1 Definition of road pricing	120
6.1.2 The economic idea of efficient pricing	121
6.1.3 Different categories of road pricing	123
6.2 Related research activities	125
6.3 Situation at country level	129
6.3.1 Importance of road pricing	130
6.3.2 National road pricing situations	131
6.3.3 Legal framework conditions	136
6.3.4 Attitude of goods transport professionals	137
6.4 Regarded case studies (project-level)	139
Example 6.4.1: Oslo (Norway) (incl. Bergen, Trondheim)	144
Example 6.4.2: London city 'congestion charging' (UK)	149
Example 6.4.3: Rome (Italy)	154
Example 6.4.4: Heavy Vehicle Fee / LSVA (Switzerland)	160
Example 6.4.5: Kilometerheffing (The Netherlands)	167
Example 6.4.6: Péripherique Nord de Lyon (France)	171
6.5 From theory to practice	174
6.6 Specific considerations for urban freight transport	176
6.7 Conclusions and recommendations	185
6.7.1 Conclusions	185
6.7.2 Recommendations	188
<b>7 Urban freight platforms (UFP)</b>	<b>191</b>
7.1 Introduction	191
7.1.1 Background and need for action	191
7.1.2 Definitions and classification	192
7.1.3 Aims and benefits	198
7.1.4 Problems and controversies	201
7.2 Related research activities	202
7.3 Situation at country level	205

7.3.1	Importance of urban freight platforms	206
7.3.2	National situation regarding urban freight platforms	208
7.3.3	Legal framework conditions	213
7.4	Regarded case studies (project-level)	214
	Example 7.4.1: City Logistik Kassel (Germany)	219
	Example 7.4.2: Tenjin Joint Distribution System, Fukuoka (Japan)	221
	Example 7.4.3: Stadsdistributiecentrum Leiden BV (NL)	224
	Example 7.4.4: Hammarby Sjöstad, Stockholm (Sweden)	231
	Example 7.4.5: Cyclone Couriers, York (UK)	234
	Example 7.4.6: Cargo Center Graz CCG (Austria)	236
	Example 7.4.7: LGZ Hochrhein, Rekingen (Zurich, Switzerland)	241
	Example 7.4.8: Heathrow Airport Consolidation Centre (London, UK)	245
7.5	Synthesis from the case studies	251
7.6	Conclusions and recommendations	258
	7.6.1 Conclusions	258
	7.6.2 Recommendations	260
<b>8</b>	<b>Intelligent Transport Systems (ITS)</b>	<b>264</b>
8.1	Introduction	264
8.2	Definitions, classification and description of Intelligent Transport Systems (ITS)	266
8.3	Explanation of different telematics applications	269
8.4	ITS and urban freight transport	273
8.5	Related research activities	275
8.6	Situation at country level	280
	8.6.1 Importance of ITS for urban freight	280
	8.6.2 National situation regarding ITS	283
8.7	Regarded case studies (project-level)	289
	Example 8.7.1: Traffic Information Pilot Vienna (Austria)	295
	Example 8.7.2: MOSCA (Germany)	298
	Example 8.7.3: eDRUL (Netherlands)	301
	Example 8.7.4: M.E.R.ci (Italy)	304
	Example 8.7.5: Commercial Vehicle Fleet Management System (Hungary)	307
	Example 8.7.6: VMTL (Germany)	311
8.8	Synthesis from the case studies	315
8.9	Conclusions and recommendations	316
	8.9.1 Conclusions	316
	8.9.2 Recommendations	318
<b>9</b>	<b>Public Private Partnerships (PPP) in urban freight</b>	<b>320</b>
9.1	Introduction	320
	9.1.1 Definitions, classification and scope	321
	9.1.2 Players, incentives, opportunities and risks	325
9.2	Related research activities	329
9.3	Situation at country level	331
	9.3.1 Importance of PPP for urban freight	332
	9.3.2 National situation regarding PPP	334

9.3.3	Legal framework conditions	339
9.4	Regarded case studies (project-level)	341
	Example 9.4.1: Cargo Center Graz (Austria)	346
	Example 9.4.2: Espaces de livraison de proximité (ELP) Bordeaux (France)	349
	Example 6.4.3: Morning market MABRU in Brussels (Belgium)	351
	Example 9.4.4: SpediThun (Switzerland)	354
	Example 9.4.5: City Centre Distribution Groningen (Netherlands)	357
	Example 9.4.6: Bevoorravingsplan Binnenstad Utrecht (Netherlands)	360
9.5	Synthesis from the case studies	363
9.6	Conclusions and recommendations	366
	9.6.1 Conclusions	366
	9.6.2 Recommendations	368
<b>REFERENCES AND CONTACT PERSONS</b>		<b>370</b>
<b>ABBREVIATIONS</b>		<b>376</b>

## FIGURES

Figure 1: Sources of Best Practices and thematic structuring	10
Figure 2: Kind of surveys within the cities	13
Figure 3: National and 8 regional urban networks in the Netherlands	34
Figure 4: Use of different types of measures within the regarded projects	36
Figure 5: Survey Zones and Measures in Barcelona	37
Figure 6: Traffic regulations at Junctions in Barcelona	38
Figure 7: Combined-use of streets (Balmes St.) in Barcelona	39
Figure 8: Automatic Enforcement based on advanced camera image processing (Digidock) in Barcelona	40
Figure 9: Transshipment at Mercabarna Wholesale Market in Barcelona	41
Figure 10: Zone Access Control - Old Town of Barcelona	42
Figure 11: Use of Capacity in Copenhagen	45
Figure 12: Consignment sizes in Copenhagen	46
Figure 13: Vehicle Matrix in the Netherlands	49
Figure 14: City Centre of Amsterdam	50
Figure 15: Freight problems in Cordoba	55
Figure 16: Freight problems in Sevilla	56
Figure 17: Zones with different regulations in Cordoba	57
Figure 18: Solutions in the city centre of Sevilla	59
Figure 19: Strategy for Sevilla	59
Figure 20: Goods demand in Genoa	60
Figure 21: Vehicles for freight transport in Genoa	60
Figure 22: Stop stations for the freight transport in the city centre of Genoa	61
Figure 23: Percentage of online-shoppers buying different goods [Ernst & Young; 2000]	69
Figure 24: Growing importance of B2B e-commerce	72
Figure 25: Growing importance of B2C e-commerce	72
Figure 26: Turnover generated by online shopping in percent of total retail sales in 1999 [BCG; 2000]	74
Figure 27: Internet shoppers as a percentage of working age population [OECD; 2001]	74
Figure 28: Different categories among the collected projects	77

Figure 29: Number of projects relying on different last-mile solutions	78
Figure 30: Choice of pick-up point [www.relaystar.com]	81
Figure 31: Information Flow Overview [Dujardin; 2001]	82
Figure 32: Tower24: delivery, storage and picking-up [IML; 2001]	87
Figure 33: Caddy-Home home delivery service [www.caddyhome.be]	91
Figure 34: Shipping boxes (“Dispoboxes”) [www.leshop.ch]	94
Figure 35: LeShop products are delivered by the postman [www.leshop.ch]	95
Figure 36: Picking process using conveyor belts in LeShop’s dedicated warehouse [www.leshop.ch]	96
Figure 37: Bike trailer for home-delivery by the “Service Porteur”	98
Figure 38: The ServiceLog process [Swiss Post; 2001]	102
Figure 39: Store-based picking model [Browne; 2001]	103
Figure 40: Dedicated picking centre model [Browne; 2001]	104
Figure 41: When people want their products delivered [Hultkranz / Lumsden; 2000]	106
Figure 42: Impacts of business-to-business E-commerce on transport volumes	110
Figure 43: Interdependence of B2C e-commerce and logistics	114
Figure 44: The assessment triangle [PRIMA 2000]	123
Figure 45: Countries covered by the material collection	129
Figure 46: Today’s and future importance of road pricing in general (number of countries)	131
Figure 47: Today’s and future importance of road pricing for urban freight transport (number of countries)	131
Figure 48: Urban road pricing development in Europe	133
Figure 49: Legal situation on urban road pricing in Europe	137
Figure 50: Collected projects according to their extension	139
Figure 51: Collected (urban) projects according to their status	140
Figure 52: Collected (urban) projects according to their objective(s)	140
Figure 53: 19 toll stations circle the Oslo city centre [Waersted 1998]	145
Figure 54: Oslo toll ring station (south-west-entrance) [Waersted 1998]	146
Figure 55: Toll ring station on a minor road [Waersted 1998]	148
Figure 56: The central London Congestion Charging Scheme Area [Rowe 2001]	150
Figure 57: Limited Traffic Zone with 24 entry gates [Tomassini 2001]	155
Figure 58: Smart cards and On-Board-Unit (OBU) [Tomassini 2001]	156
Figure 59: OCR equipment at the entrance gate [Tomassini 2001]	157

Figure 60: Example of dissemination material [Tomassini 2001]	158
Figure 61: “TRIPON” On-Board Unit [Oehry 2001]	162
Figure 62: Border crossings recorded with DSRC [Oehry 2001]	162
Figure 63: Self serving machine and ID-Chip Card [Oehry 2001]	163
Figure 64: LSVA On-Board-Unit from inside and outside the vehicle [Oehry 2001]	164
Figure 65: Vehicle position (GPS) is linked to road type and tariff (GIS) [Kleijn 2001]	169
Figure 66: Péripherique Nord de Lyon [www.peripheriquenord.com]	171
Figure 67: Promoting the télépéage system [www.peripheriquenord.com]	172
Figure 68: Time savings and benefits	182
Figure 69: Activities on a freight platform [REFORM 1999, p. 8]	193
Figure 70: Single-company and multi-company platform	194
Figure 71: Company structure versus institutional solution of freight platforms	195
Figure 72: Urban transport patterns calling for synergies [COWI/NTU 1996]	199
Figure 73: Countries covered by the material collection	206
Figure 74: Past, today’s and future importance of UFPs (number of countries)	207
Figure 75: Collected projects according to type of platform	214
Figure 76: Collected projects according to their main objective(s)	217
Figure 77: Collected projects according to their status	218
Figure 78: Map of Tenjin district and joint distribution centre [Taniguchi 2002]	221
Figure 79: Hakozaki Joint Distribution Centre	222
Figure 80: Estimated effects of the Tenjin District JDP [Ieda et al. 1992 quoted after Taniguchi 2002]	223
Figure 81: The fleet of electric vehicles of the Leiden CDC	225
Figure 82: Electric van distributing in Leiden, Netherlands	229
Figure 83: The Hammarby Sjöstad logistic centre (HSLC) [Brisvall 2002]	231
Figure 84: Truck guidance by smart traffic signs [Brisvall 2002]	232
Figure 85: Inside the Hammarby Sjöstad logistic centre [Brisvall 2002]	233
Figure 86: A Rickshaw of the 21 <sup>st</sup> century [www.cyclesmaximus.uk]	234
Figure 87: Location within the national and regional network [Dorner 2002a]	236
Figure 88: CCG with direct connection to motorway and railway [CCG 2002]	237
Figure 89: Map of the CCG area [Dorner 2002b]	239
Figure 90: Two cranes for transshipment [Dorner 2002a]	239
Figure 91: Entrance gate and warehouses of the CCG [Dorner 2002b]	240



Figure 92: Planned segmentation of the platform [Züst 2002]	242
Figure 93: Impact of the LSVA on the mode of transport [Züst 2002]	243
Figure 94: Congestion at Heathrow terminal 3 delivery point [BAA 2002]	245
Figure 95: Thermo container and roll-cage inside Heathrow Airport [BAA 2002]	247
Figure 96: Exel vehicle airside at Heathrow [BAA 2002]	249
Figure 97: Location of a freight platform and traffic generated [Baumgarten et al. 1996]	252
Figure 98: Efficient delivery ? [Newspaper ad, Tagesanzeiger 24.3.1994)	256
<b>Figure 99: City Logistics and links to other tools</b>	267
Figure 100: Traffic management system	269
Figure 101: Fleet Management System	270
Figure 102: Freight Management System	271
Figure 103 : Concept of a virtual distribution centre	274
Figure 104: European countries covered by the material collection	280
Figure 105: Importance of ITS nowadays and in the future	281
Figure 106: Kind of telematics application	289
Figure 107: Fields of existing activities in ITS	290
Figure 108: Planned activities in the field of ITS	291
<b>Figure 109: Traffic management system</b>	296
Figure 110: Mobile Info Services	297
Figure 111: eDRUL Reference Architecture	302
<b>Figure 112: Part of Genoa City Centre</b>	304
Figure 113: Control and communication system	308
Figure 114: Structure of the INVENT project	312
Figure 115: Goals of the INVENT project	312
Figure 116: Forms of PPP and their degree of formalisation [Roggencamp 1999]	322
Figure 117: Contractual forms of PPP [PWC 2000]	323
Figure 118: Dimensions and organisational forms of PPPs [Roggencamp 1999]	324
Figure 119: Possible PPP-Protagonists in urban freight [according to Balasko 2000]	325
Figure 120: Opportunities and risks of a PPP [according to Roggencamp 1999]	328
Figure 121: Countries covered by the material collection	332
Figure 122: Past, nowadays and future importance of PPP for urban freight (number of countries)	333
Figure 123: Type of PPP	343
Figure 124: Project Phase of PPP	343

Figure 125: Cargo Center Graz – functional diagram [Erlach 2002]	347
<b>Figure 126: Espaces de livraison de proximité (ELP) Bordeaux</b>	349
Figure 127: The morning market MABRU in Brussels	351
Figure 128: City of Utrecht	361

## TABLES

Table 1: Methods applied within the collected examples	15
Table 2: Overview on used methods within the examples for statistics and surveys	16
Table 3: Main interest group in regard of urban goods transport	30
Table 4: Street quality classification in Bremen	53
Table 5: Zones and time windows in Cordoba	58
Table 6: Overview on all online-shop examples collected	79
Table 7: Different logistic solutions for various online-shopping models and their impact on transport volumes	111
Table 8: Classification of freight platforms [based on REFORM 1999 and Visser et al. 1999]	196
Table 9: Overview on collected urban freight platform projects (marked projects are presented in detail)	215
Table 10: Average number of shipments per week of the CDC	227
Table 11: Overview on collected ITS projects (marked projects are presented in detail)	292
Table 12: Overview on collected PPP projects (marked projects are presented in detail)	344

## 1 Introduction

### 1.1 The BESTUFS Thematic Network and need for action

Background and  
need for Action

More than 80% of today's road freight trips in European conurbations are on distances below 80 km and can be defined as urban or urban-regional transport.

The delivery and collection of goods within urban and metropolitan areas, especially in the core areas of cities with old and established centres has a major impact on the local community concerning the economic power, quality of life, accessibility and attractiveness of a city. This means that an efficient and environmental friendly urban transport system is essential for the economic health and the quality of life of cities.

It is therefore important to assess the opportunities and chances of technical (vehicle technology, telematics applications, etc.), organisational (co-operation, etc.), operational (route planning, etc.) and political (time windows, weight limits, etc.) approaches for improving the urban transport systems.

Starting up the  
BESTUFS  
Thematic Network

The EC established the thematic network (TN) on BEST Urban Freight Solutions (BESTUFS) in January 2000 with a duration of 4 years. BESTUFS is aiming at identifying and disseminating best practices with respect to urban freight transport. The concept of a thematic network is thereby focusing on the co-operation of experts and projects with already existing or just emerging experiences and expertises and on the collection and raw analysis of results of national and European projects - rather than starting new research activities.

The thematic network BESTUFS contributes within the 5<sup>th</sup> Framework Programme to the Key Action „Sustainable Mobility and Intermodality“ (part of theme 3 “Competitive and Sustainable Growth”) focusing on “Modal and Intermodal Transport Management Systems” (task 2.3), especially transport and mobility services (Task 2.3.2) concerning urban goods transport.

A continuation of BESTUFS is foreseen and will start in 2004. BESTUFS II is foreseen within the 6<sup>th</sup> Framework Programme.

Main objectives of  
BESTUFS

- BESTUFS is establishing and maintaining an open European network between urban freight transport experts, user groups/associations, ongoing projects, interested cities, the relevant European Commission Directorates and representatives of national, regional and local transport administrations in order to identify, describe and disseminate best practices, success criteria and bottlenecks with respect to the movement of goods in urban areas. The main objectives of BESTUFS are:

- To create a permanent and dynamic concentration activity during the period of the 5<sup>th</sup> Framework Programme;
- To identify and structure the various themes which build the urban freight solutions (UFS) domain and which have relations and influence to it;
- To present projects and best practices;
- To support the clustering of projects on European level and to integrate projects and clusters into the network;
- To collect, compare and summarise available experiences and results of projects and initiatives in the UFS domain mainly for Europe but also - if easily obtainable - for the USA and other countries;
- To identify and describe best practices and success criteria within the UFS domain;
- To disseminate experiences, project relations, best practices and success criteria to a broad public of interested actors, thereby aiming at the transferability of solutions;
- To establish links and co-operations with relevant other thematic networks (treating different themes) on European level in order to share and integrate the results (regarding overlapping themes) and to avoid duplication of work;
- To establish links and co-operations with national thematic networks (treating the UFS domain) in order to share and integrate results;
- To support the co-operation between actors in the UFS domain by providing information and by providing contacts.

#### BESTUFS Glossary

The BESTUFS Glossary focuses mainly on urban freight transport and tries to create a common understanding of the used terms within all BESTUFS deliverables, workshops and discussions. It is available at [www.bestufs.net](http://www.bestufs.net).

#### More information about the BESTUFS project

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## **1.2 Relation to previous and running activities concerning urban freight**

### **1.2.1 Global level**

OECD Working  
Group on Urban  
Freight Logistics

The OECD (Organisation for Economic Co-operation and Development) set up a working group dealing with urban freight logistics. This working group follows the aimed targets of OECD, based on the Article 1 of the Convention signed in Paris on 14<sup>th</sup> December 1960, which came in force 30<sup>th</sup> September 1961 and promotes policies designed to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries. The Working Group on Urban Freight Logistics was set up to learn from international experiences and solutions, which have been proposed and implemented in OECD member countries with both successes and failures. In their actual report "Delivery the Goods – 21<sup>st</sup> Century Challenges to Urban Goods Transport" the OECD Working Group focuses on the delivery of consumer goods and highlights best practices in Member countries [OECD 2003].

Institute for City  
Logistics

In 1999 the Institute for City Logistics (ICL) at Kyoto, Japan was established. The most important objective of this Institute is to be the centre of excellence for the research and development on City Logistics and urban freight transport. ICL carries out the fundamental investigations and make it applicable to the real society. ICL also provides the platform for the exchange of knowledge, experience and information about City Logistics and urban freight transport. ICL will perform activities related to City Logistics and urban freight transport, including [Taniguchi et al 2003]:

- Organise the international conferences
- Perform investigations
- Develop software
- Provide short courses
- Issue newsletters
- Publish books and journals

### **1.2.2 European level**

THERMIE

Within the European Community programs THERMIE (1990-1994) and JOULE-THERMIE (1995-1998) the rational use of energy in transport has been looked at. Concerning urban goods transport various measures and technologies have been investigated and assessed. For more information see [www.cordis.lu](http://www.cordis.lu) under THERMIE and transport.

COST Actions

On European level the following COST Actions concerning freight transport and logistics are relevant:

- COST 310/316: Freight Transport Logistics (1989-1992)
- COST 321: Urban Goods Transport (1994 –1998)
- COST 339: Small Containers (1998 – 2001)

Especially COST 321 (<http://www.cordis.lu/cost-transport/src/cost-321.htm>) provided important base material, information and results as an input for the further activities in the BESTUFS TN [COST 321; 1998]. On one hand COST 321 reviewed current and potential measures promoted by public authorities and private parties, in the logistical, technical, behavioural, infrastructural and administrative field. An extensive survey was conducted, leading to a policy-relevant classification of observed and planned measures which were qualitatively assessed relating to their potential contribution to the improvement of the quality of urban goods transport. On the other hand COST 321 provided quantitative results on the impact of measures using simulation and modelling tools and also estimated effects in projects and case studies. Also some key figures relating to urban goods transport have been identified and provided for several cities.

The BESTUFS TN can be seen as a follow up and continuation of the COST 321 project.

Projects of the 4<sup>th</sup>  
framework  
programme

Within the 4th framework programme several projects are related to urban goods movements dealing with organisational, operational, technical and economical aspects.

Important projects are: DIRECT, ELCIDIS, EUROTOLL, EUROSCOPE, IDIOMA, IMAURO, LEAN, MOMENTUM, MOSAIC, MOST, PROPOLIS, PROSPECTS, REFORM and SURFF. These projects have been identified within the BESTUFS project during a clustering process considering urban goods transport themes as freight centres, traffic access restrictions etc. For more information see [www.cordis.lu](http://www.cordis.lu).

Projects of the 5<sup>th</sup>  
framework  
programme

Also within the 5<sup>th</sup> framework programme (1998-2002) there are a number of projects linked to urban goods transport such as EUTPII, PROGRESS, SULONGTRA, REVEAL, OSSA, MOST or CUPID (all within the sub-programme “competitive and sustainable growth”). For more information see [www.cordis.lu](http://www.cordis.lu).

Other demonstration projects concerning Clean Urban Transport started 2001 as a result of the CIVITAS Initiative (City-VITALity-Sustainability; <http://www.civitas-initiative.org/civitas/home.cfm> ), which had been launched in autumn 2000 by the European Commission as a joint Initiative between Key action Economic and Efficient Energy of the “Energy” Programme and the Key Action Sustainable Mobility and Intermodality of the “Growth” Programme). 14 EU-cities (Aalborg, Barcelona, Berlin, Bremen, Bristol, Cork, Gothenburg, Graz, Lille, Nantes, Rome, Rotterdam, Stockholm and

Winchester) and five associated cities from the accession countries (Bucharest, Gdynia, Kaunas, Pécs and Prague) are participating in pilot projects combating congestion and pollution through technologies and measures that range from the introduction of new information and transport management systems to the promotion of "clean" vehicle fleets for passengers and goods.

BESTUFS  
Clustering report

More extensive information on complementary research activities related to the BESTUFS topic of urban freight transport can be found in the BESTUFS Clustering report (Deliverable D 4.4). The BESTUFS Clustering report relates the BESTUFS themes to the body of research activity from European and national sources by clustering relevant R&D projects around the BESTUFS key themes. It is available at [www.bestufs.net](http://www.bestufs.net).

### 1.2.3 National level

On national level the activities concerning urban goods transport vary largely between the European countries.

Since the beginning of 1990 especially France (COST 321, Programme national merchandise en ville) but also Spain (COST 321, initiatives of single cities), Switzerland (COST 321, DIANE 6, City of Zurich), Belgium (COST 321, urban freight transport plans), Italy (COST 321, urban freight transport plans), Denmark (COST 321, cities of Copenhagen, Aalborg, Arhus), Germany (COST 321) and the Netherlands (COST 321) are active in urban goods transport issues. However, the concerns and also the activities differ very much between the cities within a country.

## 1.3 Themes to be treated within BESTUFS

Identified themes  
within the  
BESTUFS  
workshops

As a result of the first BESTUFS workshop on 16<sup>th</sup>/17<sup>th</sup> May 2000 in Brussels and from experiences and suggestions at further workshops the following catalogue of themes has been determined to be considered with priority within the BESTUFS project (the themes in italics have - at least partly - been treated so far):

Methodology

- Models and methods to deal with the complexity of urban freight transport chains and the shared responsibilities
- Goods transport efficiency, assessment and costs
- *Statistical data, data acquisition and data analysis*

Planning and policy

- *Land use planning and business models for urban freight platforms*
- Traffic, land use, infrastructure and regulations planning and policy

- Transport concepts and management
  - Integration of distribution centres and traffic management
  - Door to door freight transport aspects
  - Improved management of the urban road space and the kerbside access
  - Interfaces between public and goods transport
  - *City access, parking regulations and access time regulations*
  - *Road pricing, tolls and heavy vehicle fees*
  - *E-commerce and distribution (home shopping)*
  - *Night delivery*
- Co-operation and organisation
  - Co-operation of transport operators
  - *Public-private-partnerships (PPP) and stimulation e.g. via freight forums*
  - Win-win situations
- Transportation technology
  - Transport units and intermodal transfer facilities
  - Innovative urban freight transport ideas (e.g. via underground systems, pipelines, etc.) and unusual transport modes (bicycles, etc.)
  - *Urban rail freight*
  - *Vehicle technology and functionalities (e.g. low-emission vehicles), weights and dimensions*
- Supporting technology and infrastructure
  - Intelligent transport systems (ITS), transport telematics applications and systems for urban goods transport
  - *Enhanced signage and information systems (e.g. VMS)*
  - Infrastructural solutions (e.g. to improve loading and unloading)
  - Enhanced usage and maintenance of infrastructure (e.g. via a road map for transport vehicles)
  - Enforcement support (e.g. by video control)
- Legal issues
  - Relationship and harmonisation between the urban, regional, national and European legislation

#### **1.4 Aims, contents and use of the handbook**

Aims of the Best Practice Handbooks

- In the field of urban goods transport, the Best Practice Handbooks aims at
- giving information and hints about innovative ongoing strategies, concepts and activities in European countries,
  - providing knowledge and experiences of completed and running projects and actions



- providing contacts for further information.

Contents of this  
handbook

The present Best Practice Handbook is consolidating all themes considered as best practice in urban freight transport

- Statistical data, data acquisition and data analysis regarding urban freight transport
- City access, parking regulations and access time regulations and enforcement support
- E-Commerce and urban freight distribution (home shopping)
- Road pricing and urban freight transport
- Urban freight platforms (UFP)
- Intelligent transport systems
- Public Private Partnerships (Part I)

each topic consisting of

- Overview on national situations and relevant projects
- Case studies and experiences
- Conclusions and recommendations

The material for this handbook has been collected and completed by the BESTUFS contractors and members including important inputs from the involved experts and the workshops. The material for this handbook has been collected and completed by the BESTUFS contractors and members including important inputs from the involved experts and the workshops.

Use of the  
handbook

The main focus of this handbook is to get an European overview of solutions and existing activities related to the considered themes. The results are described as experiences rather than as a thorough scientific analysis.

Comments from  
readers

Remarks and input regarding this Best Practice Handbook are welcome.  
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## 2 Best Practices

### Identification of Best Practices

In order to develop a common framework for best urban freight solutions as many as possible relevant aspects which might have an impact on urban freight transport are considered. In general, different “types” of actions, research and activities can be identified to characterise best practice solutions for urban freight transport.

A best practice solution does not necessarily focus on particular measures such as the implementation of freight centres in urban distribution traffic. Also activities without direct impact on the actors of urban transport operations such as the improvement of the data and information basis or of planning tools in urban freight transport are considered. The following “types” of action can be part of best practice solutions:

- Projects, actions and activities where goods transport changes are realised – “vertical” projects. Normally, these projects are directly related to a particular problem in urban freight transport.
- Projects, actions and activities which will not directly lead to changed urban freight transport operations but which provide tools and/or knowledge to influence and prepare decisions in urban freight traffic – “horizontal” projects. These projects are focusing on the improvement of overall planning and basic knowledge, i.e. data collection, education, planning tools etc. Usually, they are not directly related to a particular problem.

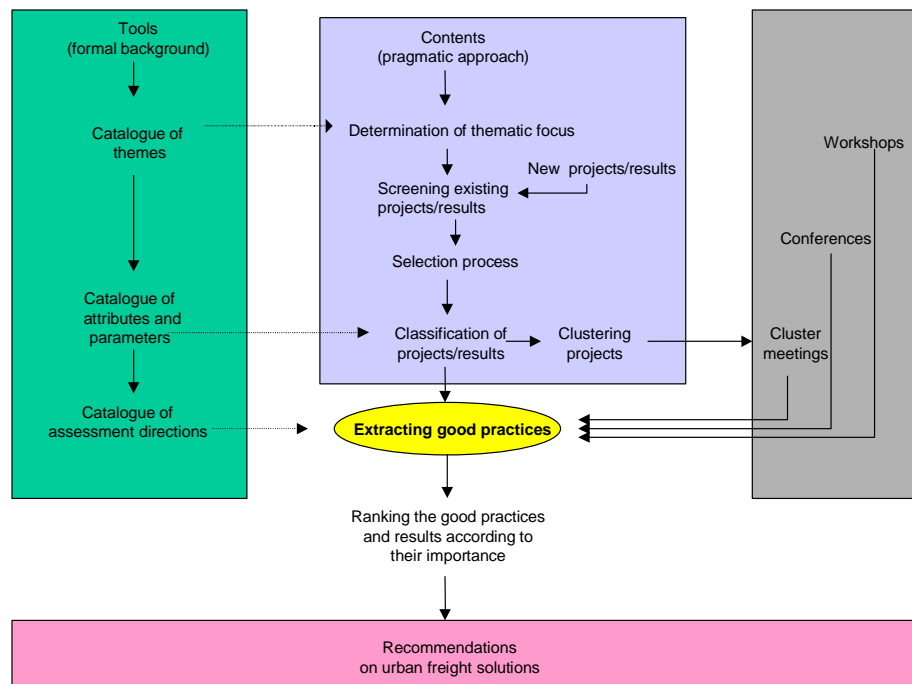
### Sources of Best Practices and thematic structuring

To analyse existing and ongoing projects in the field of urban freight transport a thematic structure is applied. This approach allows to structure all relevant material available concerning the prioritised themes of the BESTUFS network and supports the analysis of the projects.

To identify best practice in urban freight transport three “sources” will be used within the BESTUFS project:

- First, a formal approach is followed by providing tools as a thematic structure, suitable attributes and parameters as well as assessment directions.
- Second, a pragmatic approach is realised in order to assess ongoing projects as well as available project results on their contents.
- Third, workshops, conferences and clustering meetings are organised in order to extract experiences and knowledge from experts.

The following graphic describes the action lines:



**Figure 1: Sources of Best Practices and thematic structuring**

BESTUFS  
definition of Best  
Practice

Best Practices are planned or implemented private only, public only or Public Private Partnership (PPP) strategies, measures or activities which have an essential contribution to urban goods transport and ideally lead to benefits for all actors involved. Best Practices will be identified on the fulfilment degree regarding the following requirements:

- Best Practices have to fit to a defined theme or address a relevant problem with respect to the movement of goods in urban areas (see structure of themes).
- Best Practices should be based on real experiences (real world implementations, pilot projects) or analysis in studies.
- Best Practices should have considerable and measurable positive effects (qualitative, quantitative) on relevant indicators of urban goods transport.
- In some cases it can also be important to take project activities into account which have not been successful. We can also learn from bad experiences and improve solutions by describing and analysing failure factors.

### **3 Statistical data, data acquisition and data analysis regarding urban freight transport**

#### **3.1 Description of the theme**

Statistical data, data acquisition and data analysis regarding urban freight transport has been regarded as one of the most important themes during the first BESTUFS-workshop in Brussels, May 2000.

Why statistics and surveys?

One of the important first steps within urban freight planning is to get information and statistical data of the current situation and the development. These information and statistical data are important in order:

- To assess the current situation and the development.
- To identify the problems and their causes.
- To make forecasts and identify trends.
- To implement appropriate measures.
- To develop measures and to estimate their impacts.
- To make a success control of the implemented measures and for monitoring.

The Best Practices within BESTUFS show examples of procedures and methods which were successfully used. The following four aspects were regarded in detail during the material collection and assessment:

Assessment of the regarded statistics and surveys

- Identifying already available data sources of statistics and surveys.
- Methods and experiences on how to acquire data and information.
- The usage of statistical data (analysis and conclusions).
- The quality of data collection and results (in particular the comparability to other data collections).

### 3.2 Situation of data collection on country and city level within Europe

Lack of information and data collection on urban freight transport

In general it can be stated that there is a lack of information and data collection on urban freight transport within the European countries:

According to the estimations of the BESTUFS only a low to medium percentage of the medium sized and big cities in selected European countries are collecting data on urban freight transport.

Obviously there must be more cities which are collecting e.g. general traffic data (which includes in most of the cases a diversification between passenger cars and goods vehicles). But these results are often not widespread and therefore not available for further analysis or comparison between different cities. Furthermore the data are very often not detailed enough to answer special questions on urban freight transport.

A more detailed description of the situation within the cities is enclosed within ANNEX 1/I.

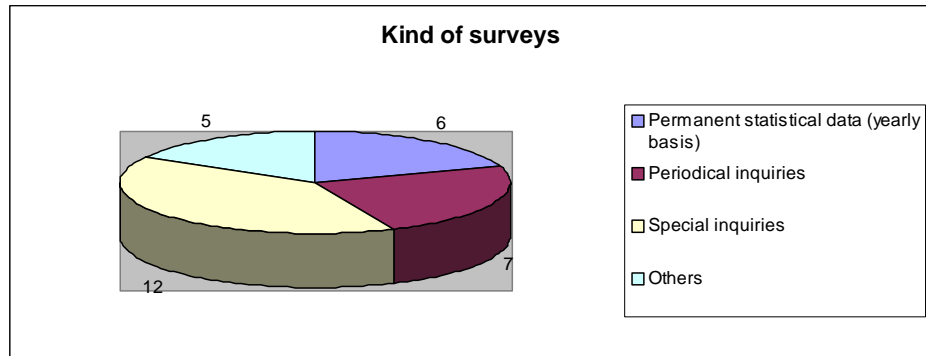
Within the BESTUFS City Inquiry 25 cities (= 58%, most of them are rather medium sized cities) answered that they were not collecting data on urban freight transport and 18 cities (= 42%, most of them are bigger cities) answered that they were collecting data [RAPP AG Ingenieure + Planer; 2001].

This shows also that the number of problems (and the awareness of the problems!) caused by freight transport depends on the importance of a city. Information and data which focus exclusively on urban freight transport are therefore in most of the cases only collected in (bigger) cities which have a higher international, national or regional importance.

Concerning the kind of data collection and used methods for data collection on urban freight transport it can be stated that (see also Figure 24):

Which statistics and surveys are done on urban freight transport?

- Most of the data are collected within special inquiries in order to get information on a special situation or question for preparation of measures (e.g. interviews with different parties of the transportation sector try to give answers on possible effects of measures or projects). In most of the cases data as traffic flows, number of vehicles, number of deliveries, type of vehicle, type of goods, transport demand (tons) or mileage are collected.
- Especially for the assessment of the success or failure of the finally implemented measure often no further data are collected.
- The permanent statistical data and periodical inquiries are not so widespread and monitoring of urban goods transport plays not yet a main role.



[RAPP AG Ingenieure + Planer; 2001]

**Figure 2: Kind of surveys within the cities**

More information and data collection on passenger transport

The situation in passenger transport is quite different from the situation in urban freight transport: the availability of statistics and data is much better than in freight transport and therefore a rather complete picture of the passenger transport systems appears. In many cities conventional statistics and surveys are done in order to get e.g. detailed information on the current situation in passenger transport in order to prepare certain measures. Stated preference surveys are used to get e.g. an input for the design and layout of railway stations for passenger transport.

It can be concluded that in general surveys and research which focus exclusively on freight transport are rather seldom and the knowledge on the urban freight transport as one part of the whole traffic system of a city is rather incomplete.

In some European countries (like Italy and France) the government and the cities co-operate together to overcome the lack of data collection on urban freight transport.

Situation in Italy given as example

The following example shows the framework conditions and the approach in Italy:

Reasons and Framework conditions

The problem of urban freight distribution seems particularly to be important where historical city centres have been developed many centuries ago (like in many Italian cities).

Public authorities, transport and retail associations, etc. are “thinking about performance of specific studies” and implement specific solutions; many agreements have been done or are in preparation among these different parties at local level in order to realise the necessary political consensus and framework.

Approach and objectives

Only a very limited number of specific studies are performed, including surveys and data collection. In spite of the lack of studies and statistical data/surveys many towns have already applied various “simple” strategies for optimising the freight transport phenomena in urban-metropolitan areas. For the most part all the initiatives are developed at local level.

One way to find a solution facing the above mentioned circumstances (in general lack of co-ordination and co-operation facing the existing problems) is a “general transport plan” (like developed in Italy: “Piano Generale dei Trasporti”, which gives the guidelines for the transport development of Italy in the next future):

Identification of a “Mobility manager in city logistics” at regional level, at province level and at municipal level. This managers would be the main responsible for the implementation of appropriate freight transport plans at local level.

The setting up, development and implementation of a central observatory at national level for the co-ordination of the different future surveys, monitoring activities, data base maintenance activities etc, performed at local level. This observatory would give the guidelines to face the urban freight transport studies/interventions through a common approach.

Support (also financial) to specific pilot projects already undertaken by local authorities or other parties:

Census and monitoring activities related to the “urban freight categories” (main actors, types of goods, etc.), updating of data bases. Particular attention would be given to the metropolitan areas.

Definition and development of specific solutions for distribution of goods in the urban areas.

Surveys for verifying the status of the commercial vehicle fleet used for distribution of goods at urban level.

Results and experiences

***The idea of a “Transport Plan” in general seems to be a good first step towards solving the problems in national, regional and urban freight transport and also how to deal with data collection on it. But the way of its implementation depends heavily on the special circumstances and framework conditions of each country and city.***

More information

Member of BESTUFS who did the material collection:

Giovanni Ruberti, Centro Studi sui Sistenme di Trasporto (CSST)

See also References and contact persons!



### 3.3 Regarded case studies (project-level)

Within the material collection on the theme statistics a number of examples were collected. Table 1 shows the different statistics and surveys which were done within the regarded examples (for all examples see Annex 1/II).

	Statistics	Specific surveys	Analysis
<b>Conventional Observation</b>	BE	AT, CH, DE, ES, FR, NL, SE, UK	
<b>Conventional Questionnaires</b>	CH	AT, BE, CH, ES, GR, NL, UK	
<b>Stated preference</b>		BE	
<b>Workshops</b>		IT (and others)	
<b>Available data used</b>			CH, AT, IT

**Table 1: Methods applied within the collected examples**

Characteristics of  
statistics and  
surveys

In general:

- The data collection is done in most of the cases by use of written questionnaires which are sent by post or e-mail and they are filled in within personal interviews or phone calls. Furthermore electronic questionnaires are used.
- Observation is done by use of forms for manual counting, tape recorders and automatic counting.
- Very often observation and questionnaires are used together.
- Several kind of software is used for creating databases and for analysis of collected data (e.g. PARADOX database, ACCESS, EXCEL, EMME/2, SATURN model, HIELOW software, WIVER).
- In Italy, France and many other countries meetings and workshops take place in order to get a qualitative idea of the situation.

- In three cases the same or only modified concept of survey is used for data collection in several cities (2, 3 and 6 cities) in order to get comparable data and to reduce costs.
- The aim of most of the examples is to prepare new concepts, to find out influence of new measures or for modelling. Only a view of the given examples show statistics which are done (periodically) in order to observe developments.

In general it is rather difficult to get detailed knowledge on statistics and data collection done within cities.

The following examples show therefore five different statistics and surveys which can be regarded as “good” examples because the concept was successfully used, shows an innovative approach and/or is regarded as fundamental work.

	<b>Statistics</b>	<b>Specific surveys</b>
<b>Conventional Observation</b>	Example 3.2	Example 3.4
<b>Conventional Questionnaires</b>	Example 3.1	Example 3.4, Example 3.5
<b>Stated preference</b>		Example 3.3

**Table 2: Overview on used methods within the examples for statistics and surveys**

<p>Example 3.1: Statistics - main data on national level</p>	<p>Example 3.1: Statistics - main data on national level “GTS 93”, Switzerland, regarded year of execution: 1993 For the whole description see ANNEX 1/III.</p>
<p>Reasons, framework conditions and objectives</p>	<p>The main objectives of the “GTS 93” in Switzerland were:</p> <ul style="list-style-type: none"> <li>▪ To get fundamental knowledge for development of political frameworks (government, parliament, administration): The increasing importance of freight transports makes it necessary to get a general view on roads goods transports on national and regional level (goods and vehicle flows and structure of these flows).</li> <li>▪ To get fundamental knowledge for reaction on new circumstances of European politics: relationship with EU, realisation of NEAT (Alpen-transversale), heavy vehicles fee (Lenkungsabgaben) and realisation of the Alpine initiative (Alpeninitiative)</li> <li>▪ To get fundamental information and main data for calibration of the models being used for traffic statistics in Switzerland.</li> </ul>
<p>Approach</p>	<p>The GTS 93 belongs to the type “Statistics”.</p> <p>A detailed Questionnaire (with examples, descriptions, in German and French) was sent as a paper version via post to the selected interviewees. 80% of the lorry owners had to fill in a detailed questionnaire and 20% a simplified one.</p> <p>The sample size was found in the following way: Random selection of 22 effective days (only working days, 5 in the 1<sup>st</sup> and 4<sup>th</sup> quarter, 6 in the 2<sup>nd</sup> and 3<sup>rd</sup> quarter of 1993), each day 1/22 of all vehicles were counted.</p> <p>The following data were collected:</p> <ul style="list-style-type: none"> <li>▪ Kind and use of goods vehicle on a fixed day (only vehicles with payload &gt; 1t).</li> <li>▪ Origin-destination (shuttle traffic, local transports, long distances, international) and all stops (loading and unloading points) during the whole run.</li> <li>▪ Use of trailer.</li> <li>▪ Reason if there was no run.</li> <li>▪ Driven kilometres during the last year, driven kilometres during the day, transports which takes more than one day.</li> <li>▪ Transported goods (kind of goods, dangerous goods, weight, customer).</li> </ul>
<p>Results and experiences</p>	<p>Main Experiences concerning effects, acceptance, procedures, involved parties, etc. are:</p> <ul style="list-style-type: none"> <li>▪ The first GTS was done by the Swiss federal statistical office in 1936/37. In 1984 the survey was boycotted by the Swiss carriers (they decided to stay at home at the chosen days, no deliveries were done) whereas for the year 1993 part of the concept was modified and the collection of data was successful. One reason for the good feedback and quality of data collection is that the whole data collection and analyses were supported by law („decree concerning data collection on freight transports 1993“).</li> </ul>

- The GTS is done periodically, only a few adaptations of the whole concept were done. This guarantees a good feedback (the procedure is already known) and the results are comparable and can be used for assessment of the developments.
- A detailed description of the whole concept and further interpretation (explanation) of some aspects (e.g. distances) within the public report helps to use data for further analyses.

Concerning the use of the collected data for analysis the following remarks can be done:

- The focus of the whole data collection was on national level. Because of the small sample size and big zones the results can be used on regional level (identification via post code) but one has to be conscious that the results of a projection on regional level can't be representative. They have to be regarded as approximate values! The statistics on national level are therefore suitable also on regional level but usually not on local level.
- Only road transport excluding delivery vehicles (< 1t) and no intermodal transport has been regarded. Therefore some important parts of the goods transports are missing, especially those which are of a high interest within the cities.

***Despite the described problems and crucial points the GTS 93 shows the importance of periodical data collection and how to get representative and useful main data.***

More information

Member of BESTUFS who did the material collection:

Martin Ruesch, RAPP AG Ingenieure + Planer

<p>Example 3.2: statistics – main data on city level</p>	<p>Example 3.2: Statistics - main data on city level “Comptage de vehicules de transport de marchandises”, Brussels, Belgium, regarded year of execution: 1999 (For the whole description see ANNEX 1/IV.)</p>
<p>Objectives</p>	<p>The main objective of the “Comptage de vehicules de transport de marchandises” in Brussels, Belgium was to get main data for modelling of the freight transport trends in the Brussels area.</p>
<p>Approach</p>	<p>The “Comptage de vehicules de transport de marchandises” in Brussels, Belgium belongs to the type “Statistics”: Counts on screen lines and number plates tacking down (Observation) gave raw material for OD matrices per type of vehicle and per period of the day.</p> <p>After many field trials, it was decided to use a classification based on the two following characteristics:</p> <ul style="list-style-type: none"> <li>▪ Single body or articulated body.</li> <li>▪ 2 axles, three axles or more than three axles.</li> </ul>
<p>Results and experiences</p>	<p>After building the current situation, trend matrices for 2005 were built. These were «business as usual» matrices which did not include any kind of transport policy measure or platform implantation. In order to find a way of predicting matrices in the year 2005, a regression analysis was carried out between number of trucks (from and to each zone) and three planning variables, namely population (P), employment in industrial activities (I) and wholesale employment (W).</p> <p>The results could be used to predict, on the basis of the land use plan, the future traffic emissions/ attractions of each zone. The future matrices have then been computed, by means of a Furness algorithm.</p> <p>Main Experiences (effects, acceptance, procedures, involved parties, etc.):</p> <p>The preparation of the whole data collection, implementation and analysis were done by an independent consulting company. They knew about the great accuracy needed, in order to observe the trends. Plate numbers tacking down on small cordon lines around the most important generators/ attractors is very powerful for making the distinction between through traffic and origin and destination traffic.</p> <p>Use of other main data was necessary to create an overall view on the situation within Brussels.</p> <p><b><i>The “Comptage de vehicules de transport de marchandises” in Brussels, Belgium shows the importance of a very good preparation of the whole data collection. Due to a profound knowledge on statistics in general and the circumstances within Brussels good results could be achieved.</i></b></p>
<p>More information</p>	<p>Member of BESTUFS who did the material collection: Hugues Duchâteau, STRATEC!</p>

Example 3.3: Special Survey – Stated preference	Example 3.3: Special Survey - Stated preference “Stated preference survey on the “Sea-river” transport”, Brussels, Belgium, year of execution: 1998 (For the whole description see ANNEX 1/V.)
Objectives	<p>The main objective was to develop a modelling tool being able to forecast the behaviour of the shippers facing the choice between sea-river transport and combined transport alternatives (sea + train or sea + road) for transport between the Brussels area and Ireland, UK and Nordic countries.</p> <p>Specific framework conditions were that the Shippers interviews were made in Belgium, UK, Finland, Sweden and Ireland.</p>
Approach	<p>This Stated preference survey was done by use of a written questionnaire which was distributed to 82 interviewees.</p>
Results and experiences	<p>Main Experiences (effects, acceptance, procedures, involved parties, etc.)</p> <p>The preparation of the whole data collection, implementation and analysis was done by an independent consulting company.</p> <p>Stated preference surveys are giving a big amount of behaviour observations with a small number of interviews. Therefore it is possible to spend enough time and money for making face to face interviews.</p> <p>The reliability of the data could be weak if the stated preference question are not carefully customized for each interview.</p> <p><b><i>The method of stated preference can be very useful for studying the impacts of some urban freight transport related policies aiming to influence the behaviour of shippers and of the customers in an urban environment.</i></b></p>
More information	<p>Member of BESTUFS who did the material collection: Hugues Duchâteau, STRATEC</p>

Example 3.4: Special Survey – used in only one city	Example 3.4: Special Survey - used in only one city “Chancen für City Logistik in Wien, Strukturhebung”, Wien, Austria, year of execution: 1998 (For the whole description see ANNEX 1/VI.)
Objectives	The main objective of this survey was to get information on urban transport activities and the potential of city logistic projects in order to reduce the existing traffic problems.
Approach	This Specific survey used questionnaires which were distributed via mail to the local business (mainly outlets but also transport providers) and manually counting (observation) of the local traffic was done. It focused only on special parts of the town.  The collected material included the number of different types of vehicles and their owners and information about service providers; types of companies, ordering systems, service level of deliveries, time of deliveries, home delivery services and other logistical parameters. A qualitative and quantitative description, ratios and conclusions regarding the mentioned categories were based on this information.  The results of this survey could be used for further analysis and for modeling (feasibility of city logistic projects like city Terminal, Cargo Tram, load zone management, city logistic controlling system, etc.).
Results and experiences	Main Experiences (effects, acceptance, procedures, involved parties, etc.)  The quality of data collection was very high and the method of the survey was very useful in order to get essential information on transport data. All data helped during the discussion concerning the implementation of city logistic projects within Vienna.  It's important to mark that the survey only focused on specific urban areas. The city was not regarded completely.
More information	Member of BESTUFS who did the material collection on the theme: Reinhard Dorner, ECONSULT

<p>Example 3.5: Special Survey – used in several cities</p>	<p>Example 3.5: Special Survey - used in several cities “Enquêtes quantitatives TMV”, Bordeaux, Dijon, Marseille, Lille, Rennens, Lyon, France, year of execution: 1995-2000 (For the whole description see ANNEX 1/VII.)</p>
<p>Reasons, framework conditions and objectives</p>	<p>Reasons for the survey (Bordeaux):</p> <ul style="list-style-type: none"> <li>▪ Needed for modelling urban freight, which is useful for decision-making processes.</li> <li>▪ Needed for prognosis because of national laws (Clean Air Act, urban planning processes). These surveys have helped produce a series of "unvarying features" (permanent results from one city to another) of urban freight transport that can guarantee the reproducibility of results in any other French cities, without doing extensive surveys.</li> <li>▪ Needed to make an environmental assessment of urban freight.</li> </ul>
<p>Approach</p>	<p>This Specific survey was developed for prognosis and forecast. 3 surveys were administered by questionnaires:</p> <ul style="list-style-type: none"> <li>▪ To a representative sample of 1500 freight generators (industry, commerce, services, ...). A first interview was done by the distribution of a notebook to the interviewee which he had to fill in during one week, then a second interview took place.</li> <li>▪ To delivery truck drivers: during one week, they had to fill in a notebook retracing their activities, locating their delivery routes and their delivery operations.</li> <li>▪ To main transport companies operating locally and regionally (in Bordeaux, 70 companies, which do most of third party delivery activities in the city). Semi-open interviews describing their practices, the use of transshipment platform, the precise urban areas in which they distribute.</li> <li>▪ The unit of observation was the "movement" (delivery or pick up operation of goods with one vehicle in one receiving/generating establishment).</li> <li>▪ Different types of questionnaires and kind of interviews were used: Face to face interviews, phone interviews, "on board" surveys, distributing notebooks via post, semi-open questionnaires.</li> </ul> <p>Afterwards a quantitative description of urban freight activities (with emphasis on unvarying features) was done: ratios of movement for each type of economic activity (there exist about 60 ratios); operating modes (own-account/third party); organizational modes (one-point delivery or delivery rounds); type of vehicle, areas of distribution; description of daily and seasonal rhythms of deliveries; duration of deliveries and distances travelled; street occupancy by delivery vehicle during parking for each zone of the city (unit = veh*hours); street occupancy by delivery vehicle during circulation (unit = veh*km).</p> <p>Good specific framework conditions were given because this survey was co-financed by the city and the national government. Furthermore there were strong incentives and initiative from the State.</p> <p>The same type of survey or "lighter versions" of it were used in Dijon, Marseille, Lille, Rennes and Lyon.</p>



Results and  
experiences

Main Experiences concerning effects, acceptance, procedures, involved parties, etc.:

- The preparation of the survey showed that the traditional techniques of doing interviews by use of questionnaires are justified by the necessity to control the use of vocabulary (vocabulary in transport activities is often ambiguous because transport concerns all sectors of economic activities with many different technical "jargons" for each. Phone method with automatic recording of answers has been abandoned in favour of mail questionnaire).
- Face to face interviews with distribution of a notebook is highly recommended for freight generators survey. Phone interviews have to be short and should be done by knowledgeable staff.
- Long delivery rounds are better known with "on board" surveys. Distributing notebooks to truck drivers (with postal return) means that only a few questions can be asked, but the postal return is fairly high (15% rate of answers).
- Semi-open questionnaires towards truck companies must be done by transport specialists.

Bordeaux, Marseille and Dijon urban freight surveys constitute a breakthrough in urban freight data collection in France. The methodology which has been elaborated since then helps all the other French cities to get a better knowledge on their freight activities without paying large amounts of money to do an extensive survey.

There is a very high interest of developing a common methodology, which can be used in all French cities and help make comparisons.

It is necessary to get financial help (from the State or any national body) for the first surveys.

***The use of the same concept for survey within several cities is a very good approach to get comparable data, to save money and to avoid faults.***

More information

Member of BESTUFS who did the material collection:  
Laetitia Dablanç, GART

### 3.4 Conclusions and recommendations

All European cities acquire some data about urban freight transport

All European states and roughly all medium and large sized European cities acquire regularly statistic data including information on traffic and transport.

Some data sets address directly freight transport, e.g. the number of lorries of a special size registered in a city or region or the transport amounts (in tons) of single business fields etc..

These data mainly describe those details which can be obtained easily without much financial effort and its use is rather limited for urban freight transport planning.

Information as e.g. the number of trips of single actors, the capacity use factors of vehicles, vehicle fleet structures, goods transports via cars or vans, the use of road space of trucks and lorries and many information more is usually missing.

Furthermore, to develop goods transport models there is information needed about e.g. transport chains, number of tours and number of stops and origin-destination matrices related to transport weights, consignments, vehicle types etc. which is also not available from the regular common statistical surveys.

In the following only these in-depth statistic data are addressed.

General lack of data in urban freight transport

The availability of statistic data about urban goods movements in European cities is in general rather poor.

This assessment is especially true when the availability of statistics is compared to the situation in general traffic and in passenger transport (both public and private), where the data basis is much better than in the freight domain. Within the city inquiry, less than 50% of the cities did some sort of freight transport data acquisition, while the majority did not report about any efforts.

Usually special project related data collection and not permanent data collection

Looking in more detail to the frequency the data are acquired, it can be seen that most of the data are collected just once, within special single inquiries in order to get information about special situations or to find answers to questions in relation to the preparation of new measures.

The acquisition of permanent statistical data and the performance of periodical inquiries are not common. Especially for the assessment of the success or failure of a finally implemented measure there were often no data or not enough data collected and a robust evaluation is therefore not possible.

Lack of financial means

The reason for this poor situation in regard of statistic data must be seen first of all in relation to the limited available budgets of public authorities and second in the ranking of priorities of cities. This can easily be proven by regarding the staff working within city administrations on goods transports. Again the rather small sample of contacted cities show clear tendencies:

- About 20% of the cities have no employees at all addressing urban freight transport issues.

- More than half of the cities have less than 50% equivalent fulltime staff (max half of one employees working time).
- And less than a quarter of the cities have one or more employees working on freight (more than 100% equivalent fulltime staff).

These percentages are not representative and have to be considered critically because very often different administration levels within a city have a joint responsibility of a task but often don't know about the total equivalent number of fulltime staff working on a specified subject. Nevertheless, the tendencies can clearly be identified [Rapp AG Ingenieure + Planer; 2000].

Necessity of statistics and surveys on urban freight transport

To identify problems and solutions concerning urban freight transport statistics and surveys play a crucial role. In general the regions and cities should put more effort in statistics and surveys on urban freight transport in order to reach the same level of information as in passenger transport because the statistics and data allows:

Benefits of statistics and surveys on urban goods transport

- To assess the current situation and the development.
- To identify the problems and their causes.
- To make forecasts and identify trends.
- To implement appropriate measures.
- To develop measures and to estimate their impacts.
- To make a success control of the implemented measures and monitoring.

Key data for situation analysis and monitoring

In order to get as good results as possible the key data has to be well chosen. Besides structure data (enterprises, employees, etc.), network data (length, density, etc.) especially the following data are in general necessary for situation analysis and monitoring (examples):

- Number of deliveries per week according to each category of activity
- Used vehicle types (trucks, lorries, vans)
- Goods vehicles flows
- Share of goods transport (in tons, mileage, etc.)
- Daily levels of road transport (over time)
- Mileage per day and per vehicle type
- Use of capacity
- Number of trips per vehicle, medium distance per trip
- Number of stops per vehicle, medium time per stop
- Number of tours per vehicle
- Use of road space by trucks, lorries, vans
- Service level (e.g. deliveries in due time)
- Emissions per vehicle km, tkm or delivered consignment
- A differentiation of key figures relating to commodity group or logistic families is often useful.

Key data for effects analysis and modelling

For effects analysis and modelling the following data are in general necessary (examples):

- Structure data per zone (inhabitants, employees per branches, etc.)
- Network data (capacity of links, nodes, travel time etc.)
- Modes (kind of vehicles, etc.)
- Data for trip generation depending on branches / products
- Data for transport chain generation
- O-D-Matrices in tons / consignment / trips (branches / vehicle types)

More consignment based information needed

A lot of surveys and data collections are mode based. For effects analysis usually consignment based data is necessary to consider the whole transport chains. Data collection and surveys should be focused more on consignments to get information over the whole transport chain.

Lack of data relating to goods transport by cars

The surveys and data collection carried out take often into account only trucks and lorries and not cars (conventional cars which are used to deliver e.g. medicaments or pizza service). But in cities the goods transport by car plays also an important role. Therefore transport of goods by cars should more be considered carrying out surveys in urban areas.

Necessity of integration and co-operation on national level

Italy and also France show how to deal with the lack of data collection but also with a lack of co-ordination and co-operation. The following aspects have to be regarded furthermore:

- The idea of a “Transportation Plan” in general seems to be a good first step towards solving the problems in national, regional and urban freight transport but the “Transport Plan” has only been launched recently in Italy and to predict its influence and effects is not possible yet.
- The implementation of a “Central observatory for surveys” has to be regarded very critically. Its competence depends heavily on the special circumstances and framework conditions of a country.
- The integration of data collection within such a “Transportation Plan” underlines the necessity of statistics and forces regional administrations to collect and prepare data.

A central institution being responsible for all questions of data collection and statistics in this context should help to get useful and competent help if it is the first time for a city or region to deal with freight transport and the according data collection

- This institution should give guidelines for all questions of statistics data and collection which are developed by use of all experiences available.
- Integration of statistics and data collection within national or regional law (like done in Switzerland and Italy) helps to enforce people in participating in necessary surveys. But especially questions concerning data protection have to be regarded carefully.

Data base on urban goods transport	<p>A data base on urban goods transport could provide data to compare the situation between different cities. Such a data base should be supported by the European commission.</p>
Failure of surveys	<p>In general one of the important first steps within urban freight planning is to get information, especially detailed statistical data. Many surveys are done in regard of special problems but often the quality of results is bad. The following reasons for the failure of a survey can be given:</p> <ul style="list-style-type: none"><li>▪ Survey is not done by competent companies / specialists.</li><li>▪ Insufficient preparation of used concept of survey and tools for data collection (causes e.g. faults during data collection or misunderstandings).</li><li>▪ Poor co-ordination with transport actors during the preparation phase. No personal contact (e.g. telephone calls) between interviewer and interviewees. Asked parties could not be convinced to fill in questionnaires.</li><li>▪ Not enough knowledge of the use of vocabulary (vocabulary in transport activities is often ambiguous because transport concerns all sectors of economic activities with many different technical "jargons" for each).</li><li>▪ Not enough knowledge on the local circumstances (e.g. important parties within transport sector, traffic situation).</li><li>▪ Use of conventional methods which are not able to generate the needed data. New concepts of surveys (e.g. stated preference) and new technical possibilities are rarely used (e.g. electronic questionnaires, telematics applications, via internet).</li><li>▪ Not enough financial means for appropriate data collection or analysis and for repetition of surveys. Therefore in many surveys only "light versions" were realised providing fairly inaccurate results. Such "light versions" are however acceptable if the concept of a survey was prepared once and then used in an appropriate scale for another city (see example of France).</li><li>▪ Not enough (useful) primary data available.</li><li>▪ Results are not comparable (e.g. with other cities).</li><li>▪ No adequate sample sizes according lack of financial means.</li></ul>
How to assure good results?	<p>Because of the above mentioned reasons for the failure of surveys the following recommendations can be given in order to approve data collection and surveys:</p>
Integrated data collection, comparable results	<p>In order to get satisfying results on (international), national, regional and local level data collection has to be planned in co-ordination with the transport actors and co-ordinated between cities.</p> <p>A "Transportation Plan" gives e.g. the guidelines for the transport development:</p> <ul style="list-style-type: none"><li>▪ Identification of a "Mobility manager in city logistics".</li><li>▪ Central observatory.</li></ul>

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	<ul style="list-style-type: none"><li>▪ Support (also financial) to specific pilot projects.</li></ul> <p>The results within different cities or regions have to be comparable. An integrated planning of data collection allows to develop appropriate concepts of surveys and to use them for different cities.</p>
Appropriate concepts and methods	<p>On one hand side existing concepts should be used whenever possible (see the examples described within this Best Practice Handbook). Especially the French example shows that the use of the same concept of survey in more than one case can save money and allows to compare results between different cities.</p> <p>But if necessary success promising new concepts should be used. Stated preference or stated ranking are nowadays only rarely used because there is still a lack of knowledge on these concepts (e.g. methods to get reasonable and qualitative results). Science and practice has to provide as fast as possible new concepts and corresponding methods. Experiences will show the practicability and then they should be used instead of inefficient "old fashioned" concepts.</p>
New "technologies"	<p>New "technologies" have to be used in order to make data collection and analysis more efficient, to avoid faults and to save money. Examples are electronic questionnaires, telematics applications (on board units, GPS), video based observation, questionnaires which can be answered directly via Internet.</p> <p>In the French example an automated tool for transfer of ratios and some unvarying features to any SIRENE data file for any city (the SIRENE data file is the statistics of all companies located in a city) was used. A software under Access is available on a CD-ROM which is available free of charge to any French city. This tool helps computing the number of "movements" according to operating mode and type of vehicle for any given area of the city (provided the area contains at least 500 economic units).</p>
Appropriate sample size	<p>According to the objectives of a data collection or a survey and the requirements for exactness the sample size has to be chosen.</p>
Costs	<p>It is difficult for different reasons to get information about costs of data collection and surveys. In general only an appropriate financial support allows to get respectable surveys and statistics. The use of new technologies can reduce the cost for data collection and preparation.</p>
Specialists	<p>In order to avoid poor results and to waste money statistics and data collection should be done by independent and competent specialists in close work together with the responsible administrative units and the transport actors. The specialists should:</p> <ul style="list-style-type: none"><li>▪ Consider all relevant factors which could have an influence on the results (e.g. specific sample, conditions, interests of interviewees, etc.)</li><li>▪ Use the most suitable methodology and tools and consider all relevant factors which could have an influence on the results (specific sample, conditions, interests of interviewees etc.).</li><li>▪ Motivate and convince the interviewees.</li><li>▪ Keep the survey as simple as possible (unmistakable questions, limit the questions and data collection to the information needed).</li><li>▪ Make a test run (especially using new approaches or when the</li></ul>

framework conditions are difficult)

- Guarantee a realistic time schedule and good organisation.
- Use staff according to the specific requirements and make a good training for the field survey team.
- Have good connections to transport actors.

Appropriate  
analysis and  
presentation of  
results

The analysis and presentation of results of a survey are as important as the whole preparation of the survey and the according data collection. Therefore consistent data bases and evaluation tools have to be implemented and a proof of reliability and plausibility of results (comparison with and analogies to other surveys) is as important as commented figures and tables.

## 4 City access, parking regulations and access time regulations and enforcement support

### 4.1 Description of the theme

“City access regulations” are regulations for all types of goods vehicles in the access to the inner cities.

Freight transport in this respect concerns both pick up and delivery activities in retailing, parcel and courier services, waste transport, transport of equipment for the construction industry and a broad range of other types of transport.

The purpose of these regulations is to reduce the negative effects in the city area caused by the interaction of goods vehicles with the inhabitants of the city and the other users of the infrastructure.

Several actors are directly or indirectly involved in urban goods transport. The following Table 3 shows all actors and their own specific interests to be regarded during planning and implementation of a measure or project:

Actor	Main interest in regard of urban goods transport
Shipper	Delivery and pick-up of goods at the lowest cost while meeting the needs of their customers
Transport-company	Low cost but a high quality transport operation, satisfaction of the interests of the shipper and receiver (shop)
Receiver / shop owner	Products on time delivered at a short lead-time
Inhabitant	Minimum hindrance caused by goods transport
Visitor / shopping public	Minimum hindrance caused by goods transport and a high variety of the latest products in the shops
Local government	Attractive city for inhabitants and visitors: minimum hindrance but having an effective and efficient transport operation
National government	Minimum external effects by transport, maximum overall economic situation

**Table 3: Main interest group in regard of urban goods transport**



To find an optimal compromise between all these interests of the involved actors is therefore a main problem of all implemented measures concerning city access, parking regulations and access time regulations like:

- Establishing special protected loading zones in areas where there is considerable delivery traffic, parking places.
- Fee for parking or use of special delivery window (city-centre-licence).
- Pedestrian zones in which deliveries can only be carried out at certain times of day or night or certain events.
- Protected zones that have to be kept completely or partly free of trucks.
- Vehicle-limiting measures (e.g. only vehicles on high standard concerning noise and emissions, length/width/height) or weight regulations (axle-weight, total train weight).
- Access regulations depending on (only at certain points) existing regulations within the urban infrastructure (e.g. narrow bridge).

In addition project relevant enforcement support (enforcement of rules and regulations) has to be regarded because it is a critical factor in the success of the policy on parking/loading/unloading and city access in general. Enforcement is traditionally a labour intensive task and is therefore costly. However new applications of information and communication technology (ICT) may improve the “enforcement efficiency” and enlarge the scope of enforcement.

The Best Practices within BESTUFS show projects of city access and sometimes also the according enforcement support which were successfully used.

Assessment of the regarded projects

As many innovative projects are implemented a selection of the most advisable ones had to be done. The following aspects were regarded:

- Relevance for BESTUFS, innovative character and contribution to solve problems.
- Success/failure and important experiences.
- Availability of further information.

Categories of measures

- Accordance to the following main categories of measures (see also Annex 2/I):
  - Vehicle: Emissions
  - Vehicle: Weight
  - Vehicle: Space
  - Time Windows
  - Licences(for use of loading zones)
  - Loading- and Unloading Zones
  - Road network for Heavy Vehicles
  - Slot permissions

## 4.2 Situation concerning City Access on country and city level

In the following some examples of access regulations implemented within different European cities are given and further specified. In general it can be stated that:

Legal framework conditions

Within the different European countries the possibilities to implement access regulations by law are very different and the legal framework conditions (Environmental law, Land use regulations, “open access for everybody”) have to be regarded well during planning of a measure. Also the crucial point of enforcement support has to be considered in this context.

Due to this fact measures and projects are implemented rarely and in most of the cases without integration in overall concepts.

In some countries and cities also the overall strategies have been described (besides the existing special projects) which give the framework for recent and future projects:

Legislation and strategies in France

In France most of the urban freight regulation initiatives and strategies derive from the new transport planning process initiated by the 1996 Clean Air Act, which has obliged all large cities in France to integrate freight into an Urban Mobility Master Plan (Plan de Deplacements Urbains, or PDU).

Legislation and strategies in Germany

In Germany due to an increase of environmental legislation the big cities have to work on their problems of congestion also caused by freight transport. Furthermore the rapid increase of the number of all kind of vehicles in the cities made special legislation for city planning necessary (e.g. guarantee of a certain number of parking places).

But the implementation of city access measures in Germany is depending to a large degree on the possibilities provided from the public law.

Generally, there are two possibilities to be recognised for German initiatives on access regulations:

- First to close areas for all traffic.
- Second to ban traffic due to environmental reasons.

There have been trials in several cities (Lübeck, Aachen) to close the city centre for particular groups, with no success due to law reasons. Usually, cities have pedestrian zones with limited time frames for pick up and delivery transport operations. Environmental law allows to ban or reduce traffic due to particular emissions (air pollution). Additional measures (lorry network in Bremen) requires for particular agreements in the municipality. Furthermore, several approaches to influence city delivery and city parking can be influenced by the construction and city planning (duty to build or not build parking spaces by the construction of a new building).

One example for an over all approach to reduce emissions by use of general framework conditions is the "Luftreinhalteplan Stuttgart". Following the questions how to reduce air pollution (by means of NOX and SO2) resulting from different user groups several measures have been developed and implemented.

In concrete: if air pollution exceeds a particular level the following (implemented) measures are related to traffic:

- Case dependent measures (e.g. foldable signs).
- Reduction of speed level.
- Re-routing lorries.

Further measures are considered (close particular routs for traffic, limited city access for lorries between 10 to 16 h) but have not passed the political decision yet.

Legislation and  
strategies in the  
Netherlands

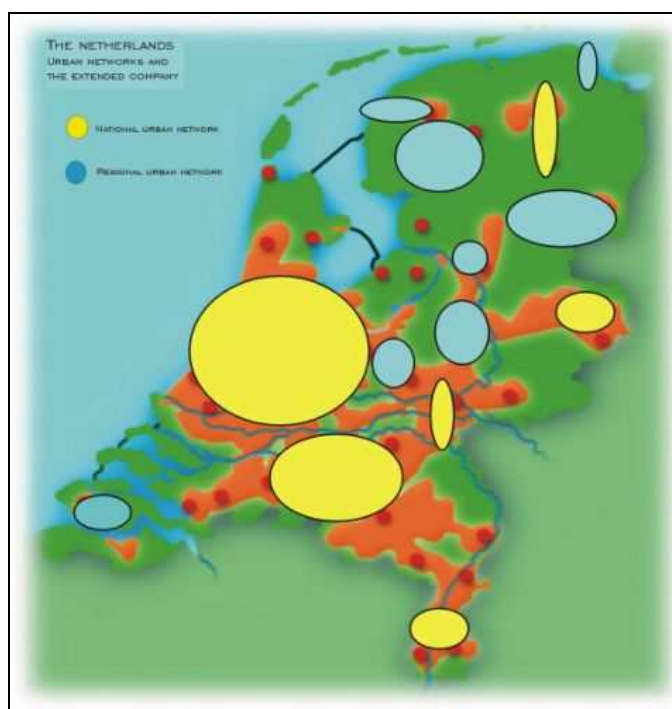
From 1990-1994, the Dutch Ministry of Transport pursued a policy to establish municipal distribution centres around cities. This policy was not successful. It required government interference into the liberalised supply chain market.

This national policy combined with a municipal policy to foster the implementation of pedestrian zones of inner cities and environmental protection had a damaging effect on sustainable solutions for the management of the (urban) supply chain. Public-private partnership was urgently required.

In 1995 a public private partnership, the Forum for Physical Distribution in Urban Areas (PSD), was established.

The work of the PDS results in profound and competent help for the cities and a catalogue of innovative measures for choice (e.g. back door deliveries, logistic routing, loading and unloading zones, dedicated infrastructure / public transport lanes, flexible time frames zones, off time and in-night distribution, urban and regional distribution centres, ICT / underground transports).

Furthermore the Dutch government initiated a White Paper in 2001 on spatial development the Dutch government indicated 14 possible urban areas. Indicating 6 national and 8 regional urban networks, the extended company concept for urban distribution can be experimented through co-operation between municipalities, provinces and business (see **Fehler! Verweisquelle konnte nicht gefunden werden.**).



[[www.psd-online.nl/english/index.html](http://www.psd-online.nl/english/index.html); 2001]

**Figure 3: National and 8 regional urban networks in the Netherlands**

Legislation and strategies in Zurich (Switzerland)

In Zurich (Switzerland) also the overall frameworks "Urban freight transport 1992" and "Goals 1996" have been developed as a strategy in order to react on the following circumstances:

- Increase of freight transports within the agglomeration.
- Urban freight transport contributes in an above-average percentage to noise and land-use; conflicts between heavy vehicles and slow traffic (bicyclists, pedestrians, motorcyclists).
- Negative impacts of urban freight on environment and quality of life.
- New laws (protection of environment, air pollution, regional planning).

The main question was "How can a certain piece of freight be transported with the most useful mode, on the shortest way and without loss of time, from its origin to its destination causing minimal costs, using a minimum of land and a minimum of follow-up pollution?". The answer on this question includes various measure like e.g.:

- Planning of policy measures (in regard of air pollution).
- Innovations, more commercial transports (less transport for own account) and better circumstances on the market in order to get a better density of deliveries.
- Better co-operation of road and rail transport systems, between pre- and end-haulage and between companies.

Furthermore there are certain measures (concerning city access) foreseen:

- To close certain roads for certain kinds of utility-vehicles, access for low-noise-vehicles.
- Commercial vehicles get access to certain zones not being available for motorcar during certain hours of the day
- Flexible delivery-windows.
- Regulations of parking- and loading-times
- Reform of wages and taxes.

The above described over all plans or frameworks to solve the problems in the European countries and cities show some existing examples. In other countries like e.g. Spain there is only a vague legislation which causes a lack of co-ordination between the responsible authorities and which avoids effective projects to solve problems.

Well-known regulations

Within the existing integrated concepts and projects processed in Europe several regulations and single measures are used. The most well-known ones are:

- Time and weight regulations (e.g. vehicles heavier than 3.5 tons only access to the inner city from 6 till 11 hrs in the morning).
- Regulations on the dimension of the vehicle (length, wideness, height).
- Regulations on levels of emissions (e.g. only EURO-2 trucks are permitted to enter the city).

In general the strength of the measures depends on the weight and size of the vehicles (the bigger, the more prohibitive they are).

Furthermore the following measures are implemented in different European cities:

- Organisation of specific parking places.
- Fee for parking or use of special delivery window (city-centre-licence).
- Protected zones that have to be kept completely or partly free of trucks.
- To allow or not allow night deliveries.

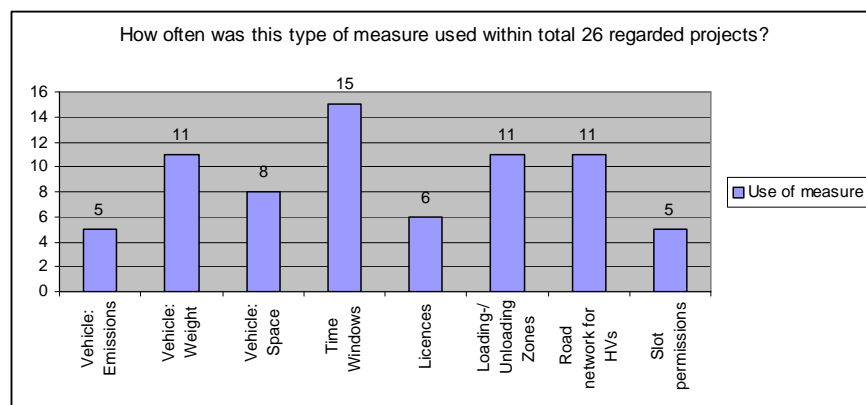
### 4.3 Regarded case studies (project-level)

Within the BESTUFS material collection on the theme City Access a number of examples were collected (for all examples see Annex 2/II).

Used type of measures

Figure 4 shows the use of different types of measures within the collected examples.

It occurs that in most of the cases time windows, regulations concerning the weight of the vehicles, special loading- and unloading zones or special road networks for heavy vehicles are used. But they are not used as single measures but in most of the cases combinations of different types of measures are implemented (the matrix in ANNEX 2/I shows the combinations within the regarded projects).

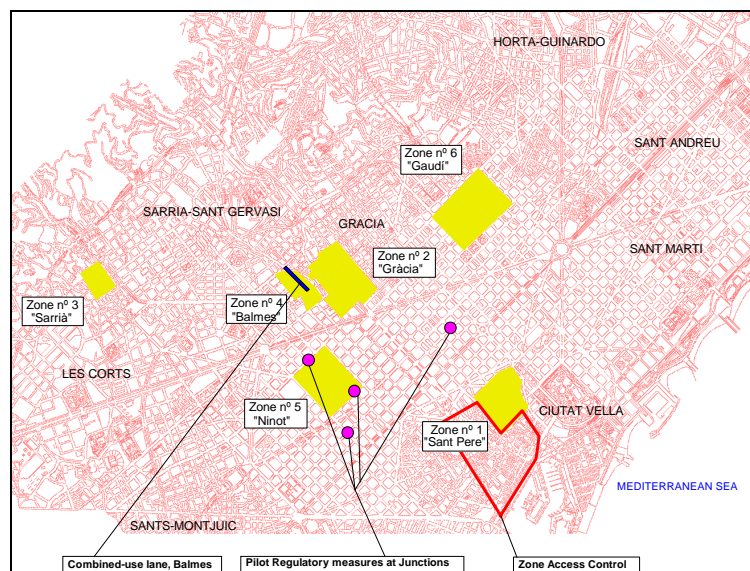


**Figure 4: Use of different types of measures within the regarded projects**

The following examples show different ways how access regulations are implemented within several European cities and which experiences were made. These 8 examples have been chosen mainly because they include several (innovative) approaches to find solutions for the existing problems and because rather detailed results and reasons for success or failure are available and help to assess the example.

<p>Example 4.1: Barcelona</p>	<p>Example 4.1: Barcelona <b>“Urban Freight Management in Barcelona”, Spain</b> [Hayes, Simon; 2000]</p>
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<p>Reasons, framework conditions, objectives</p>	<p>The project (including several different single measures) was initiated by the Municipality of Barcelona in order to approve the uncontrolled use of private vehicles which make goods deliveries more and more difficult. Furthermore the management of kerbside access with efficient enforcement was regarded as powerful measure to solve the problems and the following aspects were found within a survey:</p> <ul style="list-style-type: none"> <li>▪ Some 25'000 vehicles realise approx. 100'000 loading/unloading operations each day in Barcelona.</li> <li>▪ 4,000 kerbside spaces are required to accommodate the needs of goods delivery vehicles.</li> <li>▪ Different measures need to be applied according to different typologies (area, street - in hierarchical design).</li> <li>▪ Urban development planning norms should be modified to require delivery bays to be provided in new constructions of 400+ sq. m.</li> <li>▪ Pilot regulatory measures require efficient, automated enforcement.</li> <li>▪ Telematics techniques should be employed to optimise operations.</li> </ul>
<p>Approach</p>	<p>Because of the above mentioned survey the following measures were implemented within the city centre of Barcelona (see Figure 5):</p>

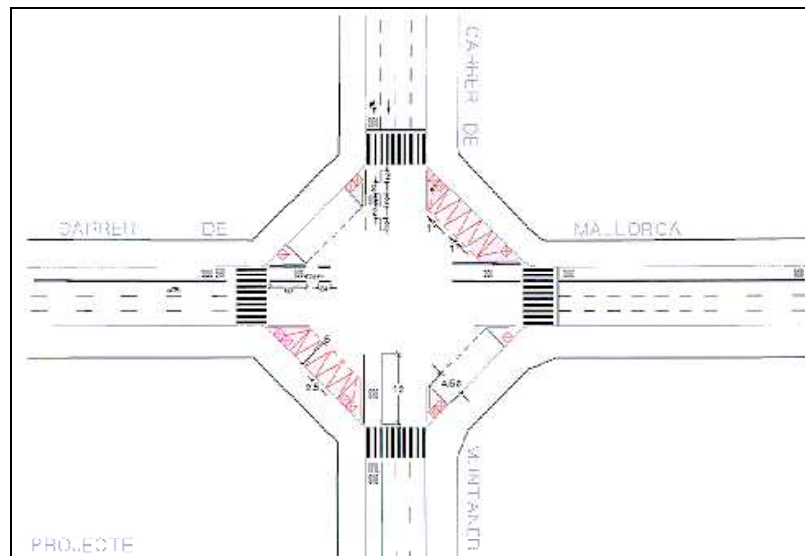


**Figure 5: Survey Zones and Measures in Barcelona**

Traffic regulations at junctions (see Figure 6) which include:

- Zones which are reserved for loading/unloading only from 08.00 until 14.00 (or 20.00) within the city centre.
- Maximum stay period: 30 minutes.

700 zones have been implemented and within the “Forum 2004 - Poble Nou Infrastructure plan” the measure will be extended to all junctions involving “Primary” roads.



**Figure 6: Traffic regulations at Junctions in Barcelona**

Combined-use of streets which is done by use of VMS messages which clarify who is allowed to use the street (residents, clear-way, deliveries) according to time of day.

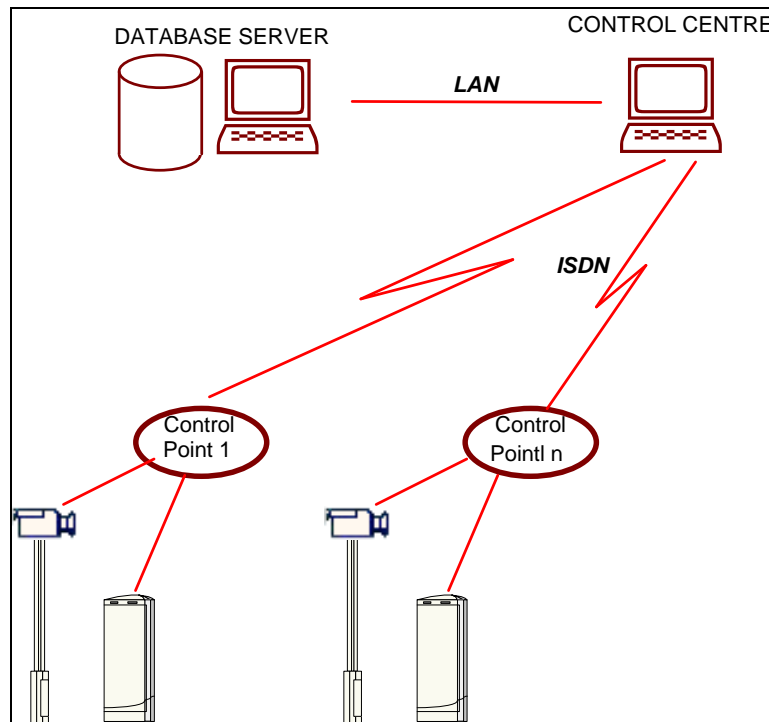
It is planned to extend the implementation of this measure to similar primary network streets.





**Figure 7: Combined-use of streets (Balmes St.) in Barcelona**

Special zones for pedestrians where access is only possible with a special permission: These zones (5 zones which are centrally controlled) have only a few entrances (50 gates are installed city-wide) with barriers which can be entered by use of a special key-card (8'000 resident cards are issued, further cards are available for delivery vehicles). For delivery vehicles access is only allowed during defined time windows. In order to avoid abuse the entrances are monitored by camera (see Figure 8).



**Figure 8: Automatic Enforcement based on advanced camera image processing (Digidock) in Barcelona**

Last but not least two transshipment points (“Mercabarna” – see Figure 9 and “Parc Logistic Zone”) have been implemented. Access to this two transshipment points is controlled and restricted by use of different equipment. The whole concept and the implemented kind of equipment might be used e.g. for access regulation of a city centre and not only for a transshipment area:

- Controlled access system: Entry by toll payment (Mercabarna).
- Contact less card payment, with automated pre-classification and NPR-systems (Mercabarna).
- Contact less card, magnetic ticket and digital video technologies control entry and exit movements (Parc Logistic Zone).
- System handles different sizes and monthly subscription is offered (Mercabarna and Parc Logistic Zone).



**Figure 9: Transshipment at Mercabarna Wholesale Market in Barcelona**

The following figures can be stated today:

- In Mercabarna (opened in 1998) the average entry volume is 10'000 vehicles per year.
- The units of Parc Logistic Zone (opened in Feb. 2001) are already 100% subscribed.

Results,  
experiences

The following experiences have been made during the first period of implementation:

- The good progress could only be reached because of a strong political will to continue & improve.
- The signed spaces allocated for goods give a 30-minute limit (defined through surveys, which is sufficient for all-but exceptional deliveries) for deliveries. Tow-away enforcement is used (strong and expensive efforts of the police are necessary in order to enforce the new measures) but to automate the enforcement is an important task which is currently a heavy policing burden.
- The implementation of all equipment (especially for the combined-use of streets, approx. 0.5 M. Euro per route) is quite expensive. Only step by step further lanes (applicable only for primary routes of the grid road system) or zones can be equipped and city-wide implementation takes long time.
- The combined-use of streets is successful. This measure is accepted by the users and could also rise the innovative image of the city.
- The acceptance of the inhabitants of the special zones for pedestrians is very high, quality of live increased.

Future approach

- The used concept for automatic fee collection (including pre-classification and automatic number plate registration) reduces waiting times and makes security measures more effective. It might be used as a “portal to the city” in order to regulate city access.

In future the following measures and services are planned in addition to the already implemented ones and their enlargement on a broader scale all over the city:

- A “depot-to-door-step” Internet trip planner is under development which incorporates the reserved spaces at the junctions as special data objects – in a similar manner to how bus stops are identified for public transport trip planner applications. This tool will become an important mechanism for helping operators decide which spaces to reserve once kerbside spaces can be individually managed.
- Clean zones with special access windows for registered, low-emission goods vehicles.
- Automated enforcement which guarantees services.
- Fixed/mobile internet itinerary guidance which integrates kerbside and network information systems.
- Assurance of final stage of the delivery chain for registered goods vehicles/operators (e.g. those recognized at transshipment centres).

It is expected that electronic kerbside access will result in shorter times for delivery based on guaranteed time-slots for goods vehicles. It will also assure the final stage of the delivery chain and improve the reliability of primary roads capacity. Furthermore service booking will increase knowledge of demand and lead to a more rational roads catalogue and better network management strategies (see Figure 10).

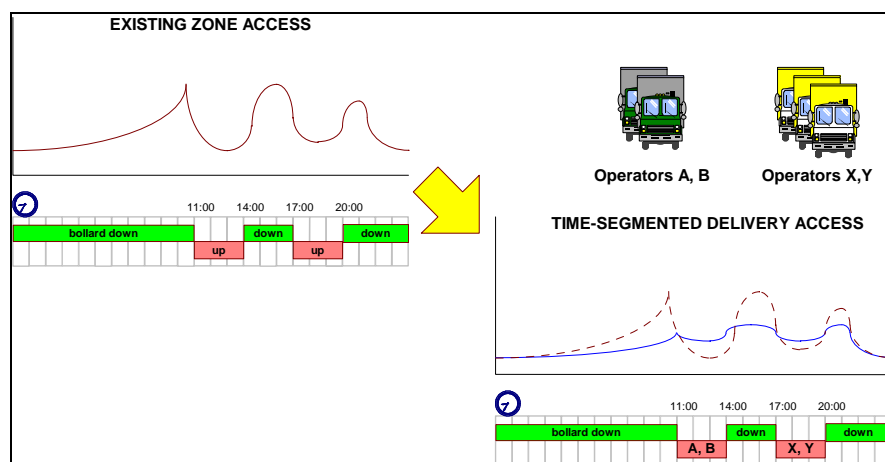


Figure 10: Zone Access Control - Old Town of Barcelona

In Barcelona some further single measures have been implemented which will be regarded within other themes of BESTUFS (e.g. Distribution platforms, Internet roads network information services).

More information

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<p>Example 4.2: Paris</p>	<p>Example 4.2: Paris <b>“New regime for the City of Paris goods delivery regulations”, France</b> [Dablanc, Laetitia; 2000]</p>
<p>Reasons, framework conditions</p>	<p>Paris is the only city in France where traffic and parking matters are not regulated by the local government, but by a representative of the national State (“prefet de police”). A review of the previous regulation was necessary as a reaction on the large amount of expressed discontents of e.g. residents, truck drivers, truck companies, police forces, bus companies.</p>
<p>Approach</p>	<p>The new delivery regime in Paris includes 6 strategies:</p> <ul style="list-style-type: none"> <li>▪ To simplify past regulations and to make them more understandable by truck drivers: Instead of 4 categories of vehicles only three are defined now. The same principle as before applies (the bigger the truck the larger the time regulations, with trucks defined by the floor surface they occupy):             <ul style="list-style-type: none"> <li>- Vehicles which occupy less than 16 m<sup>2</sup> are authorised to deliver goods at all time in the city (forbidden in bus driveways between 7:30 - 9:30 and 16:30 – 19:30)</li> <li>- Vehicles which occupy between 16 m<sup>2</sup> and 24 m<sup>2</sup> are authorised to deliver goods from 0:00 to 16:30 and from 19:30 to 24:00 (forbidden in bus driveways between 7:30 - 9:30)</li> <li>- Vehicles which occupy more than 24 m<sup>2</sup> are authorised from 0:00 to 7:30 and from 19:30 to 24:00.</li> </ul> </li> <li>▪ To increase maximum size of authorised trucks (16 m<sup>2</sup> instead of 12 m<sup>2</sup>, and 24 m<sup>2</sup> instead of 20 m<sup>2</sup>) so that professional carriers can make a better job at consolidating their load and increase the length of their delivery rounds.</li> <li>▪ To increase the number of on-street loading/unloading zones and better protect them by enforcement.</li> <li>▪ To give permanent and temporary derogatory permits to specific deliveries (flour, oil, cold, construction material, outdoor markets, post office, etc.).</li> <li>▪ To favour night deliveries.</li> <li>▪ To protect passenger peak hours from freight traffic.</li> </ul>
<p>Results, experiences</p>	<p>Exceptions exist for specific categories of goods.</p> <p>In order to enforce the regulations traditional police forces are intended to be used. But so far (despite promises of the “prefet de police” to approve enforcement), enforcement remains the weak point of delivery regulations in Paris (as in many other French cities). The harmonization with the neighbouring cities is still missing and causes problems.</p>
<p>More information</p>	<p>Member of BESTUFS who did the material collection: Laetitia Dablanc, GART</p>

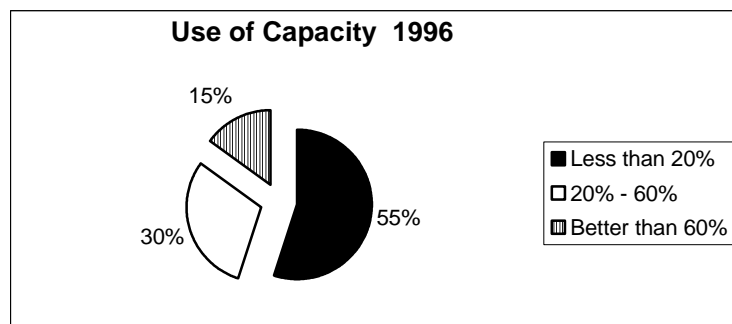
<p>Example 4.3: Copenhagen</p>	<p>Example 4.3: Copenhagen <b>“City Distribution in Copenhagen”, Denmark</b> [Jensen, Søren B.; 2000]</p>
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**Reason, framework conditions**

The project was initiated by the Mobility and Parking Directorate. Because of the increasing problems due to freight transport within the city centre.

The City Centre in Copenhagen has an inner area with a road net from medieval time. It is about 1 km x 1 km.

About 6.000 lorries and trucks daily have got their origin or destination within the city centre. The capacity utilization is very low (see Figure 11).



**Figure 11: Use of Capacity in Copenhagen**

**Objectives**

The main objective for the whole projects was to increase the use of capacity in the lorries and vans entering the city centre. The philosophy behind is that the State and the Municipalities can not establish a sustainable urban freight transport, but they can “make it easier” for the carriers to choose a sustainable solution.

**Approach**

In order to work on the problems caused by freight transport and especially a low capacity utilization a working group about goods freight in the inner city was founded and consisted of representatives from: Danish Rail, Danish Mail, Danish Transport and Logistic Association (Danish hauliers organisation), Danish Freight Association, The brewery Carlsberg, Dairy company MD-Foods, Retail store Magasin, Copenhagen City Centre Association, The Business University of Copenhagen, Copenhagen Road Department.

The carriers commit themselves to:

- In averages utilise the capacity of every single vehicle 60% over a 3-month period
- Sign up all the vehicles between 2-18 tons driving to/from the area.
- Only uses vehicles with engines younger than 8 years.

- Once every 3 months the company must send a report of the capacity use to us.

As participation in the scheme is voluntary some accompanying measures were implemented in order to encourage the companies to join in the project:

- 10 loading zones were established, exclusively reserved for the participants to load/unload goods on weekdays between 8-12.
- The companies will be entitled (by streamers etc.) to show their surroundings that they are participating in an environmental improving scheme.
- A list of the companies involved was put on the "City Distribution" webside on the Internet. So the customers could choose a "green" carrier.
- Possibility to influence a later obligatory scheme.

The control is being performed on the basis of the report send to the Road Department for each vehicle. The parking guards check if only vehicles with a certificate (sticker) in the windows hold in the loading zone between 8 and 12. All other vehicles are being fined. At the same time the guards observe the vehicles in the certificate area so that the administration can crosscheck with the information given by the companies about the capacity use.

After a year and a half the experiment ended in agreement with the carriers in the end of February 2000. 80 companies have sign more than 300 vehicles to the scheme. Several of these cars were entering the city centre several times a day. The bigger vehicles were dominating the experiment (see Figure 24). Of the total number of trucks and vans to the inner city, 88 % is between 2 and 3½ tons.

Almost all of the participants in the voluntary scheme were reportedly able to use 60% of the capacity. There were some problems with certain kind of transport(e.g. chilled goods).

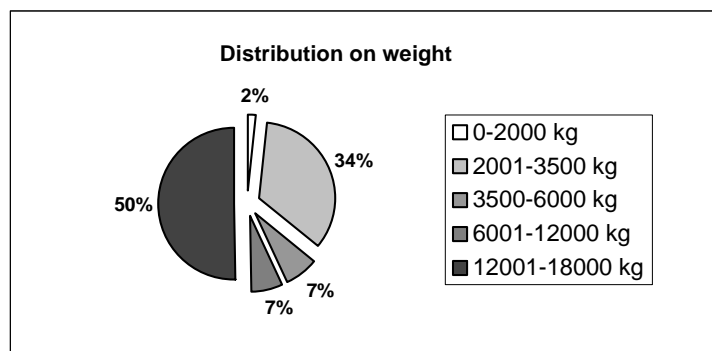


Figure 12: Consignment sizes in Copenhagen

Results,

- The carriers were in general satisfied with the scheme. For the majority it



experiences

took less than 10 minutes to fill in the apply form and the quarterly reports. 86% of the participants would like to have an obligatory arrangement.

- 20% of the carriers have changed their daily transport planning behaviour during the experiment.
- Also more city logistic collaboration between the carriers has appeared during the experiment, naturally also for several other reasons.

The ministry of Transport explained in spring 1999 that it was against the law to reserve loading zones for cars with certificate. They should be open for all trucks. At the same time the ministry promised that they would prepare a new paragraph in the law making it possible for municipalities to make experiments.

This new paragraph was presented for the Parliament in November 1999 and they agreed late April 2000. In March the Town Council has decided that we should come with a proposal for an obligatoric arrangement when the new law for experiments was ready.

Within an obligatory scheme the following regulations and exceptions will be included:

- It will either not be allowed to enter or to stop in the inner city for lorries and vans over 2 tons.
- To reserve 40 loading zones reserved for vehicles with a "green" certificate, cars there use 60% of their capacity in average over 3 months.
- "Red" (one day) and "Yellow" (transitional phase) certificate for special cases.
- Different fee for the different certificates.
- Fines for trucks and vans which are parking within the zones without certificate (about 100 Dmk).
- Vehicles as emergency or vehicles, more tools than vehicles as lifts, garbage collection etc. will not be included.

The following problem in a obligatory scheme has still to be solved: Some types of transports can not fulfil the demand of 60% use of capacity.

It is expected that the obligatory project will lead to a reduction of the number of lorries and trucks entering the city centre (about 30%). This would lead to a reduction of emissions (particles: 25%, NO<sub>2</sub>: 5%. and NO<sub>x</sub>: 10%).

More information

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Example 4.4: Stockholm	<p>Example 4.4: Stockholm</p> <p><b>“Environmental zones and other regulations in Stockholm”, Sweden, 1996</b></p> <p>[Fager, Mats; 2000]</p>
Approach	<p>The project was initiated by the City of Stockholm. From the 1st April 1996, environmental zones were implemented in the central area of Stockholm.</p> <p>The same measures were also implemented in the cities of Göteborg and Malmö.</p> <p>Within the “Environmental Zones” special environmental regulations for diesel driven heavy goods vehicles and buses were implemented. These zones are areas within a built-up area, which are especially susceptible to disturbances from traffic and where traffic regulations are implemented. Vehicles which do not have an environmental classification (noise and emissions) are not allowed to enter these zones.</p> <p>Municipal Councils have, in accordance with the Road Traffic Ordinances, the right to forbid traffic with polluting diesel driven trucks and buses with a total weight over 3.5 tons in these areas.</p> <p>The vehicles need environmental class stickers on the windscreen to get permission to the “Environmental Zone” and the police monitors.</p> <p>The following regulations are implemented within the city centre of Stockholm:</p> <ul style="list-style-type: none"><li>▪ No lorries heavier than 3.5 t from 10 p.m. to 6 a.m.</li><li>▪ No vehicles longer than 12 meters.</li><li>▪ No motor traffic (except taxis) from 11 a.m. to 6 a.m.</li><li>▪ Heavy diesel powered vehicles must not be older than 8 years (domestic and foreign vehicles).</li></ul> <p>Exceptions:</p> <ul style="list-style-type: none"><li>▪ A few through roads are excluded from the zone.</li><li>▪ Vehicles which are equipped with additional catalytic converter and not older than 12 years.</li><li>▪ Engine replacement to engine meeting the EU-requirements for the best environmental class.</li><li>▪ Vehicles which rarely have destinations in the environmental zone.</li></ul>
Results, experiences	<p>The measure led to a reduction of emissions (particles: 15 to 20%, hydrocarbons: 5 to 10 %. and NOx: 1 to 8%).</p>
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<p>Example 4.5: Amsterdam, Haarlem, Tilburg, Groningen</p>	<p>Example 4.5: Amsterdam, Haarlem, Tilburg, Groningen “Urban distribution in Amsterdam”, “Dadira in Haarlem”, “Efficient supply in Tilburg, Groningen - from city logistics to urban distribution”, Netherlands [Quispel, Martin; Visser, Hans; 2000]</p>
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Approach

In Amsterdam Haarlem, Tilburg and Groningen a bundle of measures was initiated by the municipalities in close work together with PSD (Platform Stedelijke Distriubtje / Forum for Physical Distribution in Urban Areas).

Vehicle classes	Vehicle characteristics	City access regulation
1	<i>Weight</i> : 3,5 – 7 tons <i>Length</i> : max 7 metres <i>Wheelbase</i> : < 4,5 metres <i>Width</i> : max 2,3 metres <i>Height</i> : max 3,2 metres <i>Environment</i> : Euro II, LPG, electric, gas, etc <i>Loading requirements</i> : none	<i>Always</i> , pedestrian areas have time frame restrictions – preferably between 06.00am – 12.00am
2	<i>Weight</i> : 7,5 – 18 tons <i>Length</i> : 10 metres <i>Wheelbase</i> : < 5,5 metres <i>Width</i> : max 2,55/2,6 metres <i>Height</i> : max 3,6 metres <i>Environment</i> : Euro II or more, LPG, electric, gas, etc <i>Loading requirements</i> : <sup>3</sup> 80%	<i>Often</i> , but pedestrian areas have time frame restrictions – preferably between 06.00am – 12.00am
3	<i>Weight</i> : 18 – 40 tons <i>Types</i> : various <i>Length</i> : 11 – 18,75 metres <i>Wheelbase</i> : various <i>Environment</i> : Euro II or more, LPG, gas, electric, etc <i>Loading requirements</i> : <sup>3</sup> 80%	<i>Frequent</i> , but only with special permission for the pedestrian areas and inner cities
4	<i>Weight</i> : 40 tons + <i>Types</i> : various <i>Environment</i> : Euro II or more <i>Loading requirement</i> : none	<i>Sometimes</i> , but only with special permission for the pedestrian areas and the inner cities

[www.psd-online.nl/english/index.html; 2001]

**Figure 13: Vehicle Matrix in the Netherlands**

The above shown matrix (see Figure 13) includes several vehicle classes and vehicle characteristics. The according regulations are used in regard of the special circumstances within the cities and city centres:

Amsterdam has narrow roads and streets with a lot of traffic (80% of cargo is for/from city hart). This causes hindrance for loading/unloading, stench, noise, vibrations and danger. Therefore HGV are banned out of the hart of the city. In October 1996 and end 1997 the following measures were implemented in regard of regulations of city access:

- City hart (see Figure 14) is not accessible for trucks over 7.5 ton.

- Transshipment is possible at Urban Distribution Centre
- Euro-2 norm is obliged.
- Length of the vehicles: max 9 metres.



[[www.dro.amsterdam.nl/eng/01dro/Overview.html](http://www.dro.amsterdam.nl/eng/01dro/Overview.html); 2001]

**Figure 14: City Centre of Amsterdam**

The main goal of DADIRA in Haarlem was to improve the supply of supermarkets in the non-congestion hours (6 - 7 hrs and 19 – 21 hrs) in order to improve efficiency and effectiveness in the total distribution chain.

By means of creating co-operation and using an integral approach more efficiency and effectiveness in the distribution chain is stimulated. Dadira wants to get more combined transport flows going into the city and wants to stimulate a modal shift. Two main aspects characterise this project:

- Shift the primary distribution (from production to distribution centre) to the non-congestion hours. Main purpose is to relieve the pressure on the infrastructure and to decrease the lead-time.
- Realising enlargement of the time windows in the secondary distribution (from DC to the supermarket).

The outcome of the project was quite positive.

The main lesson to be learned was to involve all parties in these type of issues.

City centre of Tilburg was upgraded from April 1999 till 2001. Implementation of the following six projects is the goal:

- Using the possibility of supplying by means via the backsides of shops.
- Making a logistic framework of requirements (weights and dimensions trucks, routing, etc.).
- Tuning, differentiating and creating flexible time windows.

- Common supply depots for shops near shop centres.
- One distribution company that takes care of the stock of the shops and home deliveries.
- Joint waste collection and cleaning services.

There is also thought about innovative logistic systems (tubing).

The most important proposed measures in Groningen are:

- Use of bus lanes for freight transport during time windows.
- More open definition of city logistics. Companies with an own DC at the outer side of the city and more than 100 shipments per day from/to the city are also recognised as being 'city logistics'. These shipments may be fulfilled outside time windows also.
- Introduction of joint depots for dropping cargo.
- Introduction of a hybrid vehicle with an exemptions to time windows and access regulations.

Results,  
experiences

In all cities PSD measured and will measure the effects of the policy packages by doing a reference state measurement and a measurement after full implementation in order to find out effects and potential for improvement.

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<p>Example 4.6: Bremen</p>	<p>Example 4.6: Bremen <b>“Recommended Urban Truck Routes - Bremen Approach”, Germany</b> [Just, Ulrich; 2000]</p>
<p>Reason, framework conditions</p>	<p>In Bremen a bundle of measures was initiated by the city of Bremen in order to work against the problems caused of rising transport volume transported by road (due to the ongoing decrease in road transport prices and the poor flexibility of the railway).</p>
<p>Approach</p>	<p>The first step was to implemented the concept "Integrative transport planning" ("IVP") in 1991: In an ongoing, open planing process all relevant economic, social and planning aspects are considered in an integrative framework including all transport modes for freight and private transport and their interactions, especially regarding correlation between land utilization, regional economic structure and mobility.</p> <p>The Truck Guidance Network was one of the measures implemented in the framework of the “IVP”. It was developed for the following reasons:</p> <ul style="list-style-type: none"> <li>▪ Traffic increase on the main routes (motorways, highways, arterial roads) lead to a shift of through traffic from these routes to smaller roads in residential areas.</li> <li>▪ Due to the increase of truck traffic in residential areas it has become more likely that courts pass regulations and/or bans on certain roads for heavy trucks. These regulations can lead to detours and possibly (if areas with a high population density are affected by diverted traffic) to even greater problems in certain residential areas.</li> </ul> <p>The concept has to determine in the street network:</p> <ul style="list-style-type: none"> <li>▪ Which routes will not be restricted for the through truck traffic.</li> <li>▪ Which routes might be restricted for heavy trucks.</li> </ul> <p>A Truck Route System was developed as a second measure (detailed analysis of the circumstances within the city were done for preparation of it) which includes different categories of streets (see Table 4). The regulations regard weight and emissions of the vehicles with exceptions for low emission trucks). The draft of the truck route system as part of the IVP concept was discussed in seven work groups. These groups consisted of delegates of local authorities (city and its surrounding municipalities), lobbies and other sectors affected (environment, harbour, commerce).</p>

Street Category	Options for regulations	Weighting factor
Motorway	no regulations, only guidance	1.0
Main routes	no regulations, only guidance	1.0
Main roads	no regulations, only guidance, higher resistance	2.0
Other roads	regulations e.g.: speed limits, total weight, temporary bans	3.0
Residential roads	significant regulations e.g. general bans	3.0

**Table 4: Street quality classification in Bremen**

Additional measures for implementing the Truck Route System:

1<sup>st</sup> stage: Voluntary Avoidance

- Map indicating the truck routes for drivers to keep the truck routes: The digital map of the city of Bremen was used as a background to which the truck route guidance network, other main roads, industrial parks (incl. street names), truck relevant information (such as bans during day or night-time, height regulations e.g. of railway underpass) and additional information are attached. Explanations are given in German, English and Russian (2). The map is free of charge.
- Improvement of the guiding system to industry parks.
- Extension of city logistic measures.

2<sup>nd</sup> stage: Avoidance by Measures

- Traffic regulation: e.g. regulations on through traffic and/or on night traffic, possibly differentiated by truck weight.
- Construction measures: e.g. guidance to extended routes of the IVP.

The impact on truck traffic as calculated in the prognosis are as follows:

- If truck routes are taken and other roads avoided (assumed rate of voluntary avoidance: 50%) the average length per trip is increased by 2.7% and the travel time is increased by 0.8%.

- After implementation of the measures of the first: potential of disturbance (number of trucks on the roads multiplied with the corresponding residential units) is reduced by 15.7% (due to the shift of truck traffic to less sensitive routes).
- The additional noise emissions occurring from the concentration of truck traffic on the roads which are part of the truck route system do not increase the existing noise level significantly.

Results,  
experiences

The recommended truck routes were accepted by the truck drivers. A concentration of trucks on roads of the truck guidance network could be measured:

- Increase on highways and highway-like roads: + 1,5%.
- Decrease of truck volume on minor roads which are not part of the truck routes: - 11%.
- Decrease of truck volume on residential roads: - 40%.

The reactions were primarily positive. However, it was criticised that no limits regarding the maximum number of trucks were implemented on streets of the truck route system.

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Example 4.7: Cordoba + Sevilla	Example 4.7: Cordoba and Sevilla “Integration of LEAN logistics into urban multimodal transport management”, Spain, 1997 - 1999 [Montero, Guillermo; Larraneta, Juan; Munizuri; Jesus; 2000]
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Reasons,  
framework  
conditions

The project was implemented in 1997 till 1999 and was initiated by the Andalusian General Directorate for Transport (AICIA) in work together with the University of Sevilla, PROINCA, DG 7.

In the city centre of Sevilla the needs and requirements of the different user groups (freight carriers, receivers and community) are often contradictory. Due to this situation, it is usually the Public Administration who needs to act as a referee, because individual user groups can barely achieve any improvements without affecting other user groups and thus creating conflicts.

**Freight Problems for case of Cordoba**

- Old historical streets are very narrow
- Archaeological sites obstructs any possibility of construction (e.g. Parking lots).
- An urban transport regulation does not exist
- The small pedestrian area will be widened
- Increased activity of private vehicles: from the outer residential zones and from the province
- Lack of logistic infrastructure: freight transport centre, road ring, etc.

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Figure 15: Freight problems in Cordoba

**Freight Problems for case of Sevilla**

- Competition for space among transport modes:
  - Important amounts of curb space used for taxi parking
  - Private vehicles parked in load/unload zones
  - Accesses to the centre congested by buses
  - Double parking blocks narrow streets
- Truck drivers operate without following regulations
- Difficult access to pedestrian areas
- Access time windows
  - Morning: 7.00 to 11.00. Exit by 12.00
  - Afternoon: 15.00 to 17.00. Exit by 18.00
- Not enough logistic infrastructure
- Same regulations for all types of trucks
- Other parties not involved in the freight transport problem
- Freight forwarders view their individuality as positive

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**Figure 16: Freight problems in Sevilla**

Despite being a private initiative which is co-financed by EU The strategic solutions that are given for the city centre of Sevilla are mainly based on Public Administration guidance, in the manner of regulations, sometimes co-ordination, and often funding support. Logistic, telematic and marketing-related concept elements have also been included to complete the concept.

Objectives

The following requirements are regarded as most important for an improvement of the situation:

- Enforcement and Legislation
- Consultation and co-operation
- Intermodal Transshipment Networks
- Logistic Sites and Facilities
- Traffic Management and Operational planning
- Land Use and Traffic Planning

Theses aspects are considered within the strategic solutions for Cordoba and Sevilla in the following way:

Approach

The concept to be applied in Cordoba consists of a classification of the city centre in two or three different zones (See Figure 17) that have different treatment, permissions, etc. The next step is to give regulations to each defined area. These regulations are based on the access of vehicles and loading/unloading activities.

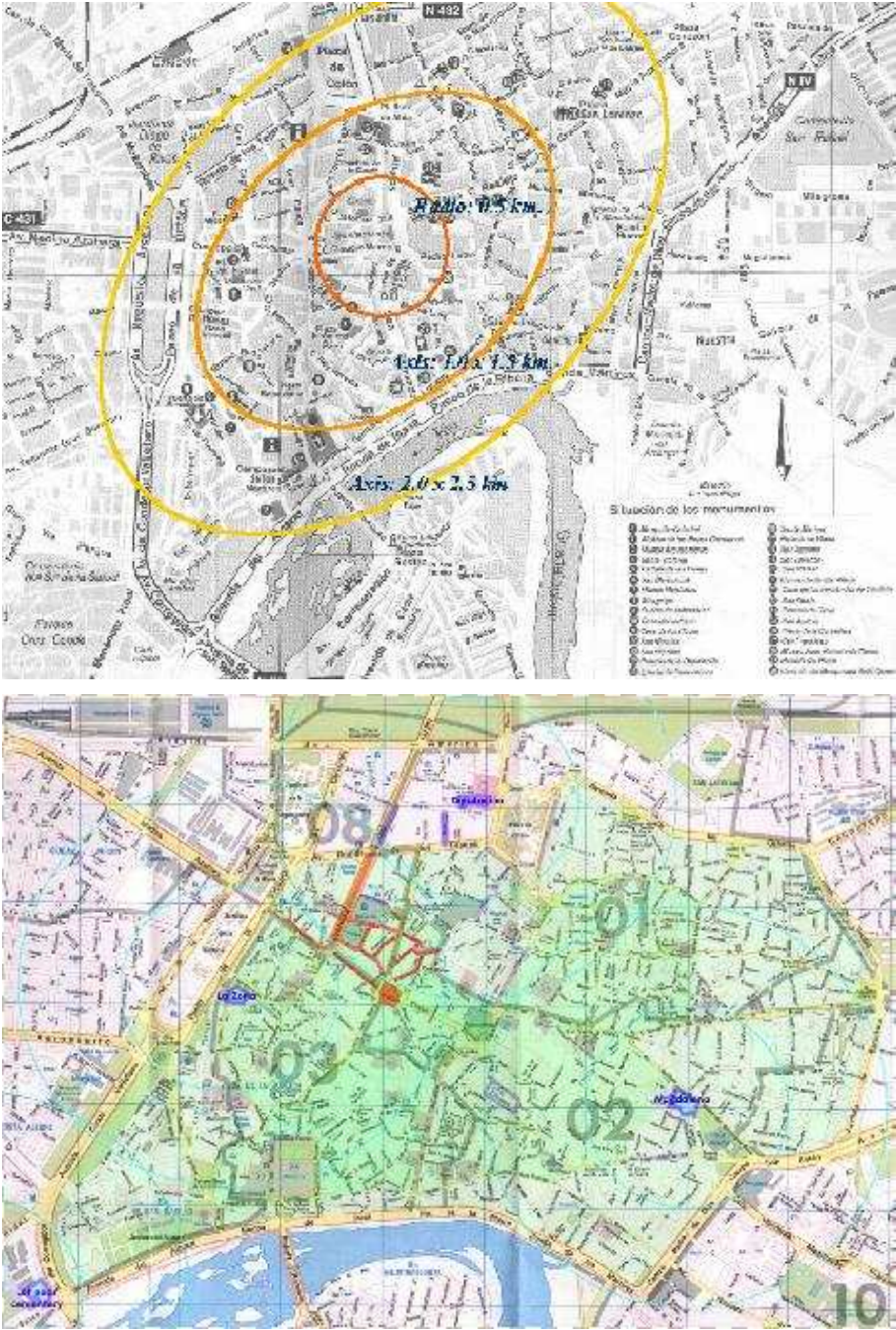


Figure 17: Zones with different regulations in Cordoba

The idea in the case of Cordoba, is to control the access and the allowed routes for the freight transporters. Often the access regulations are not observed, the authority should try to keep the quality of life for the citizens, and one way is through good control, as well as allow in special cases the access. This permitted entrance needs a permit that is given by the Council. Examples for this case are: Containers transport, Construction transport and Large vehicles

An overview of the zones and time windows in Cordoba gives Table 5. The measures include and involve loading/unloading activities and imply loading/unloading time regulations, as a balance to the access regulations.

Zone	Vehicles	Access time window	Load/unload time window
A	Weight $\leq$ 6 Tm.	20:00 – 8:30	20:00 – 12:00
		9:30 – 11:30	14:30 – 17:30
		14:30 – 17:00	
B	Weight $\leq$ 6 Tm.	20:00 – 11:30	20:00 – 12:00
		14:30 – 17:00	14:30 – 17:30
	Weight 6 - 9 Tm.	20:00 – 09:00	20:00 – 10:00
		14:30 – 17:00	14:30 – 17:00
C	Weight $\leq$ 6 Tm.	20:00 – 11:30	20:00 – 12:00
		14:30 – 17:00	14:30 – 17:00
	Weight 6 – 9 Tm.	20:00 – 09:00	20:00 – 10:00
		14:30 – 17:00	14:30 – 17:00
	Weight 9 - 12 Tm.	20:00 – 09:00	20:00 – 10:00

**Table 5: Zones and time windows in Cordoba**

The generic concept developed for the city of Sevilla consists of five different strategies which are not necessarily separate alternatives, but rather are complementary. They are presented here from the easiest one to the hardest to implement, and can be viewed as five correlative steps which constitute the suggested solution for the centre of Sevilla (see Figure 18).



Each strategy is suitable to include concepts related to Public Administration, Logistics, Telematics and/or Marketing. For each one, a list of concept elements is given.

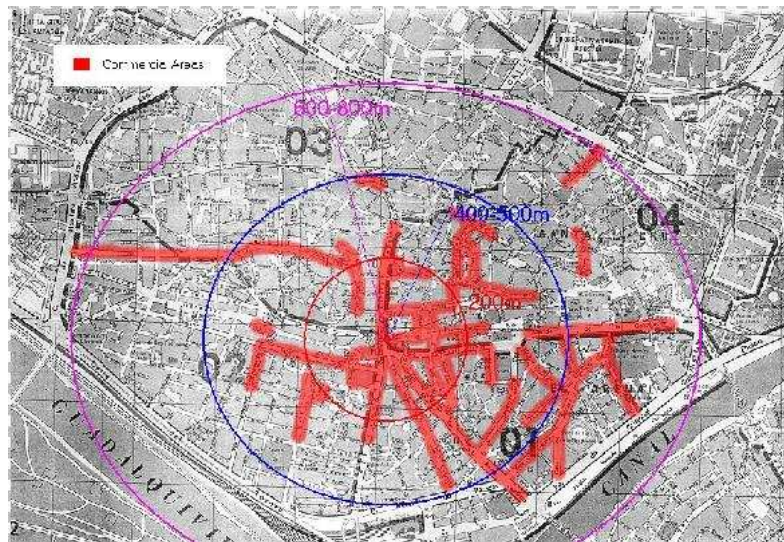


Figure 18: Solutions in the city centre of Sevilla

<b>STRATEGY</b>	Improve the performance of the current system	Better land zone use, time window revision, first steps towards co-operation
	Mini-hub system	Provided and controlled by the Public Administration
	Valley-hour deliveries	With the appropriate regulations
	Freight carriers co-ordination	Within a framework designed by the Public Administration, with the agreement of all parties involved.
	Restricted access for private vehicles	Only freight vehicles and public transport entering the city centre

Figure 19: Strategy for Sevilla

More information

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Example 4.8:  
Genoa

Example 4.8: Genoa

**“Management of Urban Freight Transport – MUFT”, Italy**

[Contursi, Vito M.; 2000]

Reasons,  
framework  
conditions

The project was initiated by the Mobility and Parking Directorate. Because of the increasing problems due to freight transport within the city centre which show the following Figure 20 and Figure 21.

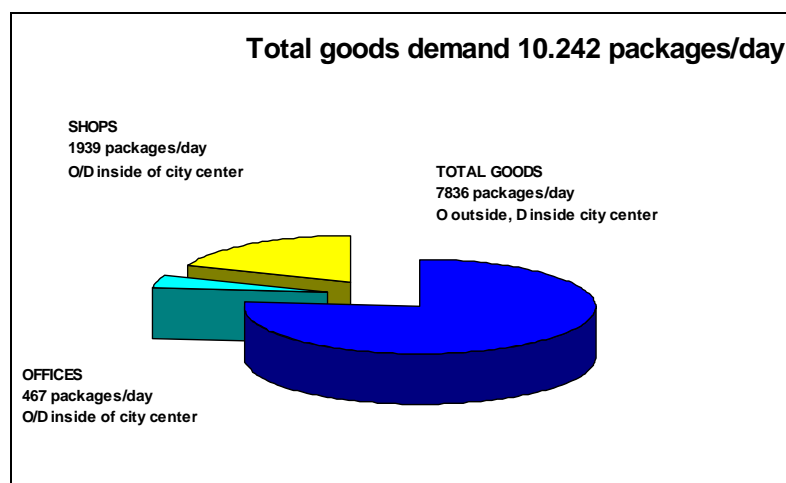


Figure 20: Goods demand in Genoa

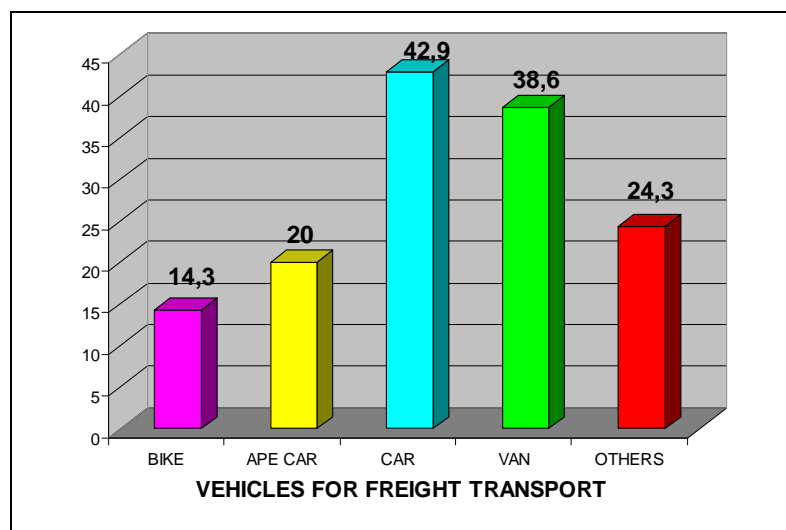


Figure 21: Vehicles for freight transport in Genoa

Objectives

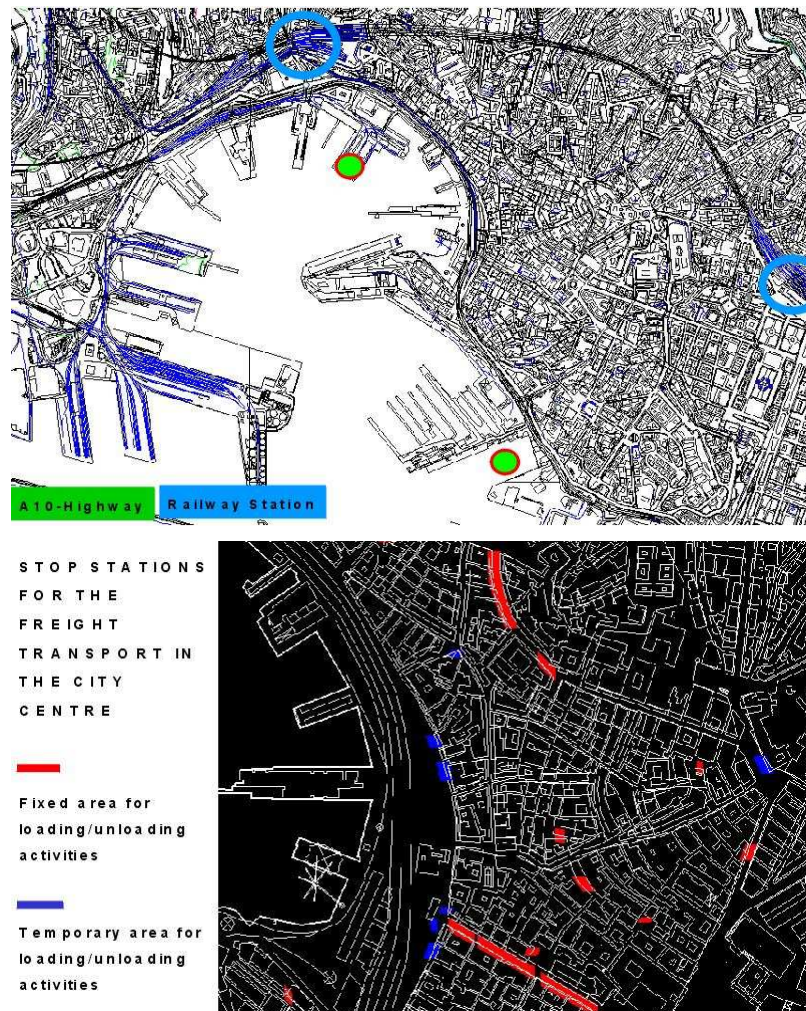
The main objectives for the whole projects were to:

- Improve the quality logistic and define services with new added value (collection of packings) and new functionalities.
- Demonstrate a rational use of the intermodal transport.
- Reduce the trips due to the freight in the urban zones and their impacts on the urban traffic flows.

In order to solve the problems in the city centre different tasks were defined like “New Delivery Services Planning” and “Use of electric vehicles”.

Approach

The task “Access regulations included certain places (stop stations) which were fixed within the city centre of Genoa (see Figure 22).



**Figure 22: Stop stations for the freight transport in the city centre of Genoa**

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#### 4.4 Conclusions and recommendations

##### Conclusions

In general the following conclusions can be drawn:

More and more  
new access  
regulations  
expected

Access regulations are widespread in Europe and it is expected that more and more cities introduce new access regulations. Information and communication technologies together with access gates are becoming less expensive and are offering a variety of complex new access schemes tailored to individual infrastructures of single districts.

Currently applied regulations can be grouped as follows: (1) regulations related to the type of transport means especially to vehicle emissions, weights and sizes; (2) regulations related to the access time to determined areas; (3) regulations related to preferred truck routes; (4) regulations related to loading and unloading zones; (5) regulations based on licences. A forthcoming regulation addresses access slots and this leads also to the issues of access control and enforcement support.

Vehicle:  
weight, emissions  
and size

Weight restrictions are the most common regulations in Europe and they tended in the past to be more and more restrictive in urban areas, which has enhanced the use (and number) of small delivery vehicles.

Existing regulations on truck size and weight within city centres are currently reviewed for making them simpler and closer to the professional needs of carriers and retailers.

The new strategies tend to stabilise regulations at a higher weight level because of the positive effects regards the number of trips and the corresponding emissions. Access regulations based on vehicle size and weight are very different within Europe but also from city to city within one and the same country.

Vehicle emissions improved considerably in Europe in the last years due to the treatment of this topic on European level leading to the ratification of the EURO norms. Nevertheless, there is an increasing number of cities offering limited access to central urban areas only for zero-emission vehicles, for electric vehicles or low emission hybrid vehicles, e.g. in the cities Amsterdam, Nürnberg and Zermatt.

Regulations related to transport vehicles are crucial for vehicle manufacturers and for fleet owners. They have to provide the right vehicle for a dedicated transport application in a dedicated region. A widest possible harmonisation of regulations is therefore highly recommended.

Delivery time  
windows

Many European cities have regulations on delivery time windows within city centres and especially for pedestrian zones.

E.g. the most common rules in France are to authorise deliveries between 9:00 and 11:00 or 12:00. There, the current strategies tend to open up time windows in the morning (starting at 7:00, closing at 12:00 or 13:00) and to extend them also in the afternoon for pick up activities and home deliveries.



Preferred truck routes	<p>Regarding night deliveries, French cities are (nearly equally) divided in two: While some cities consider this as a very good strategy to decrease the number of trucks in the city during the day, other cities argue that truck and delivery noise impacts are too high and night deliveries should be banned.</p> <p>The delivery time windows are very much depending on the opening times of shops while local habits and cultural differences lead to an acceptance or disapproval of night deliveries.</p> <p>City planners regarding the flows of heavy vehicles within a metropolitan area on a larger scale distinguish small street network links from medium and large sized main routes – as they do also for the overall traffic. Then it is possible to attach preference attributes with regard to heavy vehicle flows to single links and to assess the environmental but also the trip length effects within a model. This process leads to a preferred truck routes network and is especially useful to prevent transiting trucks from penetrating city centres.</p>
Licences (for use of loading zones)	<p>E.g. the city of Bremen has investigated in such a truck guidance network due to the following two reasons: (1) The increase of traffic led to a shift of transit traffic from main routes to smaller roads in residential areas; (2) Experiences have shown that restrictions and/or bans are leading to detours and even bigger problems in certain (other) residential areas. The aim of the new truck guidance network was to minimise the travel times and trip lengths for all trucks on the Bremen road network and for all residents affected by freight traffic. As a result the city printed and distributed a map for drivers with recommendations on routes and a final evaluation showed a positive acceptance.</p> <p>The provision and access regulation of loading and unloading zones is also an important aspect for many dense urban areas. Without such zones the delivery vehicles often stop on a regular lane as on a 2nd parking row, with partly immense negative effects to the road capacity.</p> <p>Many cities meanwhile provide dedicated zones for freight handling and e.g. in Copenhagen the access is depending on a license (see next section). In addition to public zones it is also possible to regulate the provision of private loading/unloading zones in relation to large commercial and industrial buildings. E.g. within the city of Paris all new commercial and industrial buildings larger than 250 square meters have to provide an off-street unloading area.</p>
Access slots	<p>Access slots are yet only in use on the private side in order to regulate and optimise the gate access e.g. for a warehouse or a large retailer. Nevertheless, it will become relatively easy possible on the basis of conventional technologies to control the access of individual vehicles at certain entry points or within predefined areas.</p> <p>Measures allowing only a limited number of accesses per district or per time unit can then be realised and approaching vehicles can register in advance for their access. This is still future for public domains but allows tailored solutions to implement a regulated access.</p>

Access control and enforcement control

Closely related to the access regulation is the access control and the enforcement control. Quite often in Europe the given regulations are ignored by individuals and if there is no control and no enforcement the regulation will become weaker and weaker and finally useless. A good access control hinders an easy ignorance and strengthens a regulation.

Cities in BESTUFS have shown interest to go into more detail regards access control and enforcement support because there are new supporting techniques which are yet rarely implemented and tested in Europe as e.g. the video surveillance.

Recommendation on international, national and regional level

On international, national and regional level the following recommendations can be given:

Harmonization of regulations on city, regional and national level

Many shippers and transport companies which access city centres operate not only on a local level, but are active in a much bigger geographical area. From their point of view (a higher scale level) there could exist severe conflicting regulations between cities.

These problems arise e.g. when on a tour either the same or completely different time-windows are faced. Then there is either little room for delays or else forced waiting during the trip. Also weight regulations may be substantially at odds between cities within a region. These differences are not only bad for operator productivity but are also bad for the environment (at least if one views this also from a regional/ not purely local perspective).

Technical interoperability

Conflicts may arise if e.g. in international transport one needs in the near future for each city different system technologies and components (e.g. smart cards, on-board systems) for road pricing, parking and city access control. There is little doubt that this also completely at odds with the idea of the freely accessible EU internal market.

Implementing new concepts and technologies ask for technical, operational and organisational interoperability.

Integrated planning of measures and PPP

The example of a public private partnership between authorities and transport actors in the Netherlands (Forum for Physical Distribution in Urban Areas - PSD) shows that an integrated planning of measures which is supported by the municipalities and the government helps to make implementation of measures easier.

This includes especially the possibility to compare the results and to use common experiences. But the legal status of such a PPP has to be considered well as well as the involvement of different parties.

Recommendation on project-level

In regard of the implementation of measures and regulations the following recommendations can be given:

Tailor-made solutions

Tailor-made solutions (examples Cordoba, Seville, Genoa, Barcelona) help to point on the problems which occur within the different zones of the city centres. Special cases and exceptions are always necessary and have to be foreseen within the measures like e.g. in Copenhagen where different categories of certificates are available. The local framework conditions are

	<p>important for the suitability and feasibility of access regulation measures.</p>
Work together	<p>Work together of all influenced parties (like e.g. in Copenhagen) helps to get a high acceptance and to find solutions for the different needs. This work-together has to be done already in an early stage of planning but also after implementation and analysis of first results in order to do necessary adaptations.</p> <p>The acceptance of the inhabitants of the special zones for pedestrians is in most of the cases very high because the quality of life increases. But it has to be considered that at the same time the access for deliveries of the stores gets worse. Therefore these solutions should only be implemented if really necessary and the access has to be guaranteed for all legal users. Especially the used barriers have to be well chosen in agreement with the users.</p>
Need for enforcement	<p>Often strong efforts of the police are necessary in order to enforce the new measures. They have to be considered already during planning of a measure especially in regard of the arising costs. New and automated enforcement techniques will therefore get more important in the future.</p>
Expensive equipment	<p>The implementation of the needed equipment is in many cases quite expensive. Very often the areas for implementation of a measure can only be equipped step by step. City-wide implementation can take a long time or is even impossible. There is still need for simple and cheap solutions.</p>
Information for non-residential commercials	<p>In order to get also a high acceptance of non-residentials and commercials it is recommended that information on the existing regulations is provided like e.g. done within the Bremen Truck Route System.</p>
Exemptions from regulations	<p>If a city is easily accessible and heavy goods vehicles operate effectively with high load factors there are strong arguments against the use of 'rigid time-windows and weight regulations'. Effective policy requires in this case flexible, 'tailor-made' regulations that better take into account the situation of transport operators and their customers. E.g. exemptions of access regulations (time windows, vehicle size) should be possible if vehicles are fully loaded. Also, as another example, one may think about allowing exemptions when transport operators voluntary provide route-information to the enforcement authorities (e.g. large vehicles may enter city centres provided the routes can be checked on-line by the police e.g. by using mobile communication and GPS).</p>
Measurement of effects	<p>The measurement of the effects of the different implemented regulations is a major task. Comparison has to be done between the reference state and the state after full implementation in order to find out effects and potential for improvements. For decision making the costs and benefits have to be analysed.</p>

## 5 E-Commerce and urban freight distribution (home shopping)

### 5.1 Introduction

E-commerce is one of the themes which can currently be found in all newspapers' headings. E-commerce is a fast growing market with the potential to revolutionise not only whole businesses but also lifestyle patterns and even societies. That makes it also a high priority issue for logistics service providers, forwarders and shippers. It has therefore been treated within the 4<sup>th</sup> BESTUFS-workshop and might well be a topic of a further workshop in order to show the developments within this fast changing economic sector.

What is e-commerce?

There is a great variability of definitions on e-commerce. According to Browne [2000] e-commerce can be regarded as "the purchase of goods, services or other financial transactions in which the interactive process is mediated by information or digital technology at both, locationally separate ends of the interchange". In this broad sense e-commerce was practised by companies already 20 years ago in the form of Electronic Data Interchange (EDI), the transmission of standardized information (EDIFACT) between businesses by electronic means. But it was not until the nineties that the Internet offered the possibilities to replace these highly dedicated solutions by more open systems and thus started the triumphant advance of e-commerce.

E-commerce and transport

Nowadays the information society is changing the lifestyle of European citizens and in some cases the fundamental mechanisms of the European economy. But the information society does not necessarily mean that goods and passenger movements will decrease. They will however change as a result of developments in e-commerce practices. These changes will also influence the structure of goods deliveries and passenger transports in the cities. New problems might arise requiring innovative solutions and different framework conditions.

B2B and B2C

Within e-commerce a distinction is usually made between business-to-business (B2B) and business-to-consumers relationships (B2C). Although this distinction is not directly related to the use of information technology (IT) it is usually used in relation to e-commerce as e-commerce is restructuring whole value chains transferring B2B-businesses into B2C-businesses (disintermediation) and vice versa.

The distinction between B2B and B2C should not hide the strong links between the two concepts. Any business model including more than 2 parties is inevitably partly B2B-business, as per definition only the front end relationship can be B2C (if at all). For example a retailer selling products online to customers is considered B2C, but as soon as logistics are outsourced, this part of the value chain becomes B2B. Still the distinction can be useful with regard to different characteristics of both relationships.

Transport in B2B  
e-commerce

B2B-e-commerce is typically characterised by a flow of information by means of new information and communication technologies allowing closer and more widespread collaboration between different companies. Obviously this affects goods transports as well as passenger transport patterns (e.g. more long distance business trips versus less personal meetings thanks to new communication media).

Logistics  
marketplaces /  
freight exchanges

Information technology enables the establishment of e-platforms and e-exchanges for logistics services, i.e. electronic marketplaces for freight transports and other logistics services. Such systems lead to greater transparency which increases competition and offers opportunities to consolidate orders, increase vehicle capacity utilisation and improve vehicles fleets. This can contribute to reduce traffic and freight costs. One successful example of a large freight exchange is [www.teleroute.com](http://www.teleroute.com) which claims to have 35'000 professional users in real time and 56'000 offers being posted every day. With teleroute transport operators can find a subcontractor on the basis of pertinent criteria such as departure and arrival geographical zones and time, weight and type of goods. The company also offers other services like information on transport related events, hosting of web pages and financial applications. [Quispel; 2001] However, not all freight exchanges are that successful. There are many hampering factors too, such as inappropriate loads (difficult to standardise), unreliable logistics service providers, mistrust among the market players, reluctance to share know-how, lack of neutrality among the exchange providers, problems in finding appropriate pricing mechanisms, etc. [Polzin; 1999] After a period of enthusiasm, B2B marketplaces in general are currently experiencing a backlash. A study by Mercer Consulting Company locates three main reasons. First, companies want to establish long-term customer relationships rather than fighting endless price-wars. Second, by focussing on the price aspect e-marketplaces are by far more attractive for demanders than for suppliers who fear transparency and forcing down of prices. Finally, there is no need for several identical marketplaces. [Heuer; 2001] All this indicates, that the market for this price competing transport is probably not too big.

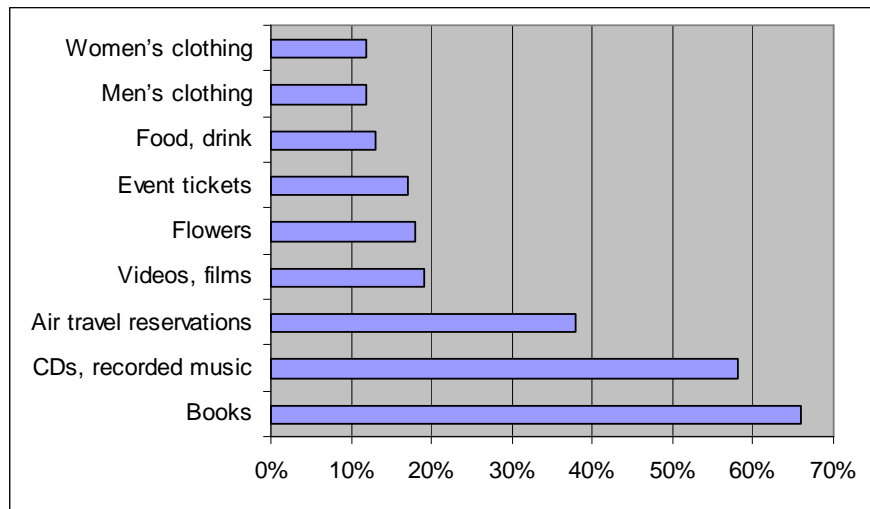
Transport in B2C  
e-commerce

B2C means business that sells products or provides services to end-user consumers. Online-shopping - or home-shopping - is the main business

model for B2C activities and often used as equivalent term, although it often includes B2B relations too. Online shopping today accounts for less than 20% of the e-commerce market and its share of overall economy sales is still infinitely small. However, it's a fast growing business and its potential for revolutionising whole lifestyle patterns and traditional business models is not to be underestimated. Concerning the physical distribution channels in general three categories of products have to be considered:

- For certain products there is no physical distribution delivery (e.g. downloading of software or music).
- For many products there are existing physical distribution channels along which the products can flow. (e.g. books purchased over the internet are handled by existing physical distribution channels of express companies and postal networks).
- For some products there is no existing physical distribution channel and it is necessary to establish entirely new means of supplying goods to customers (e.g. grocery home shopping which might require investment in and the operation of entirely new distribution platforms and vehicle fleets).

Figure 23 shows the main categories of goods purchased by world-wide online-shoppers today.



**Figure 23: Percentage of online-shoppers buying different goods [Ernst & Young; 2000]**

Consumer-at-home problem

A crucial question for the delivery channels is whether the addressee has to be present at time of delivery, whether for signing the receipt or for lack of storage facilities. Delivery to workplaces or pick-up points such as local stores, gas stations, restaurants, etc. can be another solution to the consumer-at-home problem.

Impact on urban traffic

Whereas the impact of B2B-e-commerce on urban traffic might well be neutral or positive it seems obvious that home shopping will lead to an increase in urban freight movements due to the related home delivery services. This is especially important as the additional freight traffic will occur in highly sensitive residential areas. On the other hand private passenger transports and shopping trips might decrease. If direct home delivery would succeed at a large scale even the deliveries to retail-shops within a city might be reduced. There could be a net benefit for the public, i.e. less traffic, if high levels of freight vehicle utilisation can be achieved and if former private shopping trips are not substituted with other car-related activities.

Fast changing information

Material regarding the situation of e-commerce in general and e-commerce related projects in different European countries were collected by the different BESTUFS contractors and members. Further input came from the involved experts and the workshop. The following chapters summarise the main findings of the material collection on country and project level. As e-commerce is a fast growing and quickly changing market the available information and its assessment represents today's situation only. It might change rapidly depending on the future evolution and further diffusion of

e-commerce.

Other related  
projects

The following other European or national research projects dealing with e-commerce and urban freight have been identified: [BESTUFS; 2001]

- EUROSCOPE (Efficient urban transport operation services co-operation of port cities in Europe: Traveller information, logistical information and communication, traffic management)
- IMAURO (Integrated Model for the Analysis of Urban Route Optimisation)
- PDS (Forum for Physical distribution in Urban Areas)
- French national research program on urban freight (Enquêtes quantitatives TMV)
- SURFF (Sustainable Urban and Regional Freight Flows)
- UFMB (Urban Freight Management in Barcelona)
- SULONGTRA (Effects on Transport of Trends in Logistics and Supply Chain Management)
- Euro-CASE (The European Council of Applied Sciences and Logistics) study on freight logistics and transport systems in Europe



## 5.2 Situation at country level

14 countries  
represented

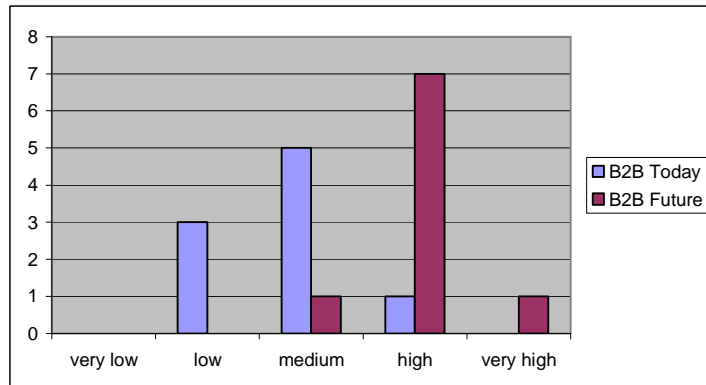
Material on 14 countries has been collected, covering the whole European Union except Portugal, Ireland and Luxembourg, plus Switzerland and Norway.

Fast growing  
importance of E-  
commerce

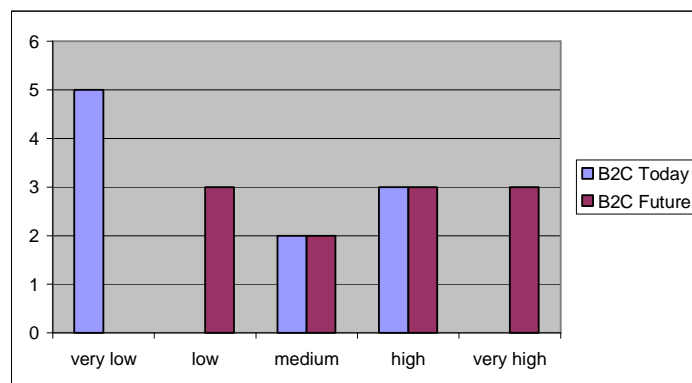
Among all the countries participating in the material collection there seems to be one general consensus about e-commerce, namely that its importance will be growing, whether it is within B2B or B2C (see Figure 24 and Figure 25). Although single countries' judgements might differ slightly, 3 general findings can be stated:

- E-commerce is of rather little importance compared to the whole economy but growing very fast.
- B2B business covers a much larger share of the e-commerce market than B2C (in general around 80%).
- In spite of its still very low overall importance B2C e-commerce (online shopping) is considered more important with special regards to urban freight movement because of its higher potential for changing the urban transport patterns.

The spread in the assessment of B2C e-commerce importance reflects rather different assumptions and personal biases of the answering experts than real differences between countries, because in any of the European countries the turnover created by B2C online shopping represents less than 1% of the total retail commerce (see Figure 26). This small percentage explains the frequent rating "very low" whereas those who attributed a medium or high importance to B2C e-commerce probably had its potentially large influence on urban transport in mind. In any case, no clear pattern is visible among the different answers.



**Figure 24: Growing importance of B2B e-commerce**



**Figure 25: Growing importance of B2C e-commerce**

Existing national studies

In all European countries e-commerce is considered a highly innovative issue and a big variety of national studies on the topic have been elaborated. However, most of them focus rather on consumer behaviour, companies' strategies, market potential, electronic payment issues, etc. than on transport. Although some studies do assess e-commerce with regards to transport and traffic there is no study available so far focussing on urban transport patterns.

Legal framework conditions

At the moment there is no special legislation concerning e-commerce in any of the participating European country. However, legal issues are discussed in most of the countries, especially with regards to electronic transactions and consumer data protection. In some countries legal frameworks are currently being implemented or draft versions are being discussed:

- Belgium is putting in place a "framework" based on EU directives.

- In Greece a Presidential Decree has been drafted by a special expert committee in order to strengthen security and transparency in electronic transactions.
- Norway has set its objectives and strategies concerning e-commerce in the White Paper No. 41 1998-99 (English summary: <http://odin.dep.no/nhd/norsk/publ/veiledninger/024031-120002/index-dok000-b-n-a.html>)
- In Spain there is a normative draft in order to regulate the services around e-commerce (see Project E - 01).
- In Switzerland a new law is going to be established which will give Swiss consumers the same protection concerning e-commerce as European consumers.

Of course, the existing city access regulations can result in constraints for the distribution of products ordered electronically by consumers or businesses in (inner) cities.

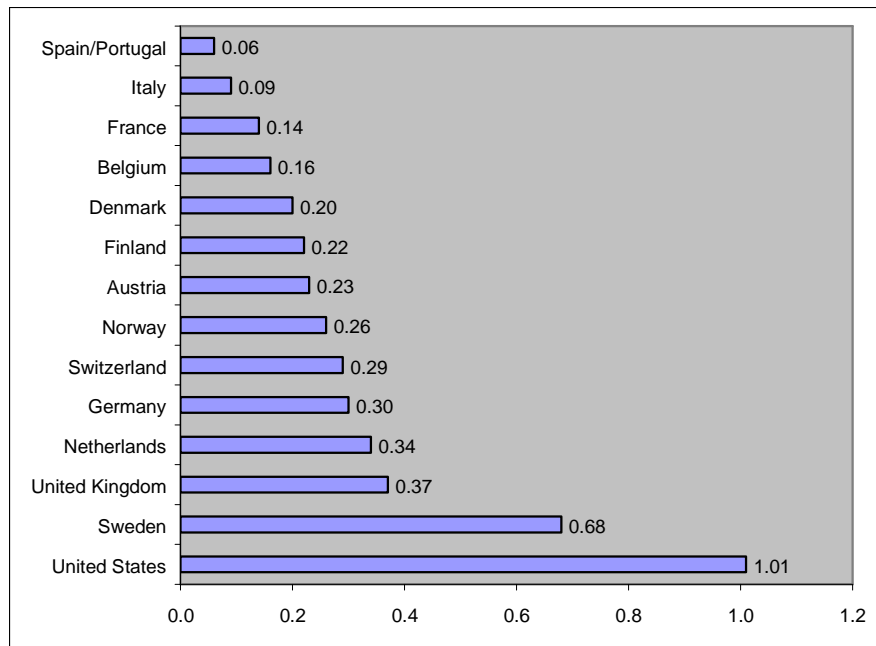
#### Private initiatives

In Austria a consumer oriented quality certification system concerning e-commerce has been established. 14 firms are certified so far, 66 are currently being evaluated. [Dorner; 2001]

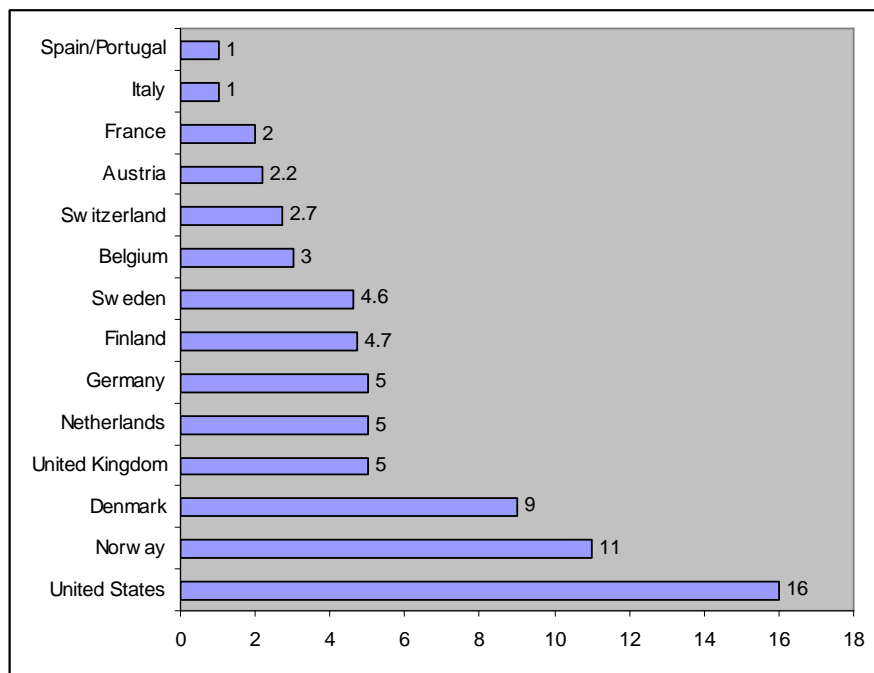
In Belgium, the Belgian Business Federation (FEB) published a voluntary Code of Conduct for e-commerce in August 2000.

#### Different levels of development: North-South digital divide

There are substantial differences between the countries' levels of online-shopping activities, although a general pattern among European countries is hard to recognise from the collected data. However, the southern European countries seem to show less online-shopping activities than the northern countries, confirming the existence of a so called "North-South digital divide". This finding corresponds with the results of a study on e-commerce by the Boston Consulting Group (see Figure 26) and a recent OECD study (see Figure 6). According to the latter, the Scandinavian countries, the UK, Germany and the Netherlands are among the online-shopping pioneers in Europe (depending on which indicator is used). However, this is still far behind the US figures. The United States remain the largest market for B2C e-commerce, currently accounting for more than three quarters of the world's total. [OECD; 2001] The low online-shopping activities in countries such as Greece, Italy, Spain, Belgium or to a lower extent France are at least partly explained by one or several of the following reasons:



**Figure 26: Turnover generated by online shopping in percent of total retail sales in 1999 [BCG; 2000]**



**Figure 27: Internet shoppers as a percentage of working age population [OECD; 2001]**

B2C. This is due to their different level of economic activity but also to their different economical structure. Large companies have been drivers to the e-development, whereas small companies usually lack financial resources to be pioneers. The fact that e.g. in Italy Small and Medium Enterprises (4/5 of them with less than 15 employees !) account for 92% of the Gross Domestic Product partly explains the country's backwardness towards e-commerce. [Ruberti; 2001]

Public Internet access

Obviously Internet access for the consumers is a key condition to online-shopping activities. But whereas 80% of the Swedish population have Internet access at home or work, this is true for only 45% of the Fins and in Greece Internet access is still limited to 10% of the population. [Firth; 2001] However, although easy Internet access is key to online-shopping it does not necessarily mean that the online-community also does so. Whereas in Sweden only 10% of all Internet users also shop in the Web, this percentage almost doubles for Norway or the UK. [OECD; 2001]

Logistics capabilities and costs

People's propensity to use home shopping possibilities depends heavily on the price-quality relation of the service offered, i. e. among other quick and cheap delivery. Thus, the absence of a large number of distribution networks and big logistics operators in countries like Italy is a barrier to the development of e-commerce. Whereas in the UK an average home delivery takes 4 days at a cost of 4 EUR, in Italy it takes 16 days and still costs 7 EUR. As a consequence home shopping is still to be developed in Italy. [Ruberti; 2001]

Shopping habits

Even with all other factors being equal online shopping activities would still differ between countries due to different shopping habits. In Belgium consumers prefer to touch products before buying them and are reluctant to choosing products either on a catalogue or on the Internet, whereas in France, especially in the northern cities and in medium size cities there is a strong tradition of mail-ordering. Also home delivery after traditional shopping in a physical store is quite common in France. In the UK there is still door step delivery for milk.

Often neglected is the social aspect in shopping which in some countries is more marked than in others. In Spain shopping trips are often done on Saturdays including the whole family and are perceived as social events with meeting friends and drinking coffee.

Confidence in new forms of payment

Lack of confidence in forms of electronic payment is another common hurdle to online-shopping. In countries with a widespread use of credit cards where consumers could build up confidence in non-cash-related financial technologies one would expect less resistance to new technologies like e-cash or e-signatures. This is rather true for the Nordic than for the southern countries (Scandinavian countries were among the first with a dense network of Automatic Teller Machines).

Online shopping baskets

In general the shopping baskets of online customers look quite similar all over Europe. Books, music, software and travel related products are dominating, probably not least because they can be delivered using existing distribution channels. When it comes to food and groceries the picture is less homogenous. Whereas in countries like Austria, France, the UK, Switzerland and the Netherlands online shoppers also buy food via Internet (still a minority though), this sales channel is far less used in other countries - if at all. For instance Greek consumers are very reluctant to buying food, furniture and clothes via Internet, although this might be due to the country's general low level of e-commerce development.

Although e-commerce brings along the possibility of borderless trade, online sales continue to take place mostly within the consumer's home country or region: 80% of European B2C e-commerce takes place within Europe. [BCG; 2000]

Heterogeneous data

There are many figures available on national e-commerce development, but the available information is very heterogeneous. Statistical data is referring to different samples of different sets. It is therefore very difficult to directly compare these figures. This applies not only to the material collection for the present Best Practise Handbook but to statistics on e-commerce in general, as stated by a recent OECD study. [OECD; 2001]

Effects on national transport patterns

Information on national particularities concerning the effects of e-commerce on logistic chains and passenger as well as goods transports is generally scarce or even non-existent. In Germany the market is dominated by the so called Portal Strategy where a web-portal aims at generating a sufficiently high volume of sales in order to make the delivery (to workplace, home or pick-up points) from a central warehouse economically viable. Many home delivery services are provided by large parcel services such as Deutsche Post. The German parcel market is expected to almost double within the next 5 years. [Vastag; 2001] In France, most grocery online shopping solutions rely on dedicated picking warehouses, although some operators have chosen to go back to shelf picking in the physical shops in order to save money. However, this business is nowhere profitable yet. [Dablanc; 2001] The same process can be observed among British online food retailers. [Mortimer; 2001]. In Switzerland, the City of Zurich is aware of the problems which might be generated by online-shopping (e.g. additional traffic, increase of small consignments, etc.). A first step is therefore the integration of pick-up and delivery points within the land use and traffic planning (reservation of special areas). [Glücker; 2001]

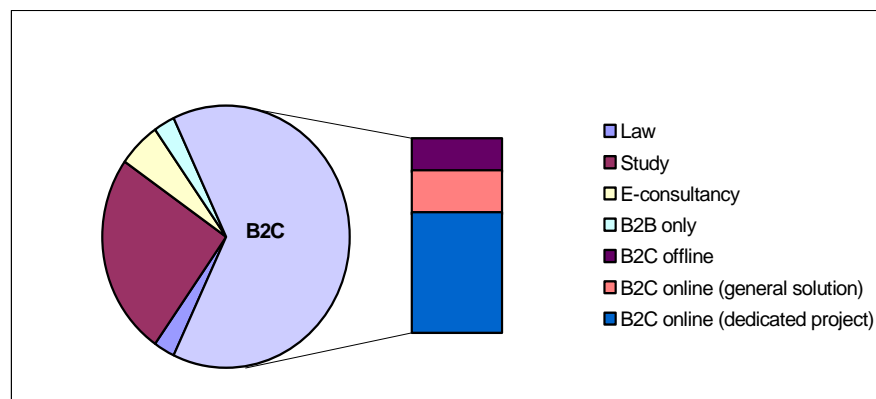
Single countries

A more detailed report on each country's situation concerning e-commerce and urban freight distribution is given in Annex I.

### 5.3 Regarded case studies (project-level)

33 projects collected - focus on B2C online-shopping

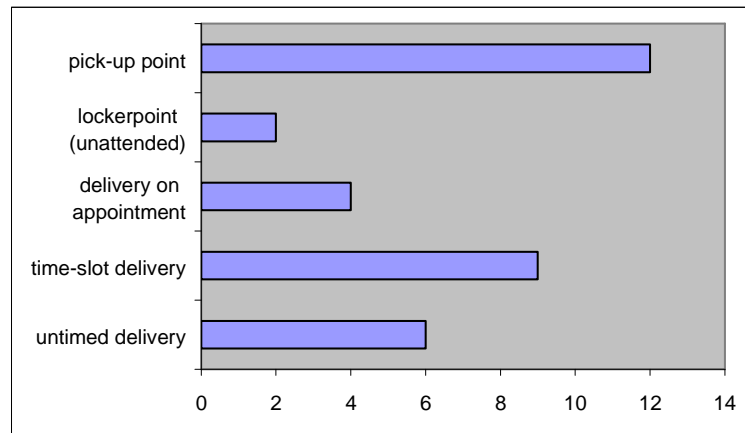
Within the material collection on the theme e-commerce 35 projects were collected (for a description of all projects see Annex II). Figure 28 shows that the majority of the collected case studies is concerning B2C online-shopping projects. The following analysis will therefore focus on this segment. The high number of studies highlights the avant-garde character of the topic. Many projects are internal projects of private companies. As they want to protect their innovation lead against competitors these projects are often classified confidential and access to information is restricted. Furthermore, information on the economic success of the projects is scarce. Therefore, projects should be seen rather as examples of innovative business solutions than as best practise cases in the usual BESTUFS-definition. More general case studies on e-commerce can be found at [http://www.iss-awareness.cenorm.be/home/Home\\_frame.htm](http://www.iss-awareness.cenorm.be/home/Home_frame.htm).



**Figure 28: Different categories among the collected projects**

Approaches for the last mile solution

The B2C-shopping examples can be further divided according to their solution of the last mile distribution problem. Figure 29 shows the number of projects using different approaches to this key problem. Annex III lists the collected examples and their applied last-mile solutions in detail. Usually not only one possibility is offered, but the customer is given the choice among various possibilities. However, for some projects the applied approach was not very clear from the available information. Furthermore, the border between time-slot delivery and non-timed delivery is blurred as the time-window expands.



**Figure 29: Number of projects relying on different last-mile solutions**

Online-shopping projects

Table 6 gives an overview on the 13 online-shopping examples. Almost all of them offer the full range of supermarket products, food and non-food, some on a national level, others are restricted to certain cities and regions. As groceries are perishable goods a majority opted for developing new distribution channels instead of contracting the existing post and parcel services. Some combined existing logistics services with new concepts of delivery. Old distribution channels alone are only used for non-food items (e.g. books, CDs, etc.). Many of the online-shops are affiliated to existing brick-and-mortar shops or supermarkets, only two are purely online. Although some claim to be profitable it is quite probable that most of them aren't so far. These might be considered as strategic investments in a future market (knowledge development) or as marketing tools for image creation.

Assessment of the projects

The following project descriptions show examples of planned or implemented e-commerce projects and assess the experiences made. As many innovative projects are planned or set-up a selection had to be done. The following aspects were considered:

- Relevance for BESTUFS, innovative character and contribution to solve problems
- Success / failure and important experiences
- Balance among countries and approaches
- Availability of further information.



Code	Project / URL	Product range	Turnover (Million EUR)	Operating area	logistic channels	Physical (brick-and-mortar) shops ?
BE - 01	Ready.be	supermarket products	not profitable	City	new	Yes
BE - 03	www.caddyhome.be	full supermarket range	11	Region	new	Yes
BE - 04	www.proxis.be <a href="http://www.proxis.be/">http://www.proxis.be/</a>	Books, Audio, Video	n. a.	International	old / new	No
CH - 01	www.migros-shop.ch	3500 daily use products	n. a.	Regions	new	Yes
CH - 03	www.le-shop.ch	> 4000 daily use products	4	National	old	No
CH - 04	www.lidomarkt.ch	> 3300 daily use products	n. a.	National / Region	old / new	Yes
CH - 05	www.spar.ch	> 2500 daily use products	n. a.	3 cities	new	Yes
D - 01	www.einkauf24.de	3000 daily use products	n. a.	2 cities	new	Yes
E - 02	www.elcorteingles.es	full supermarket range	n. a.	National / Regions	old / new	Yes
F - XX <sup>1</sup>	www.telemarket.fr	grocery goods	50	City	old / new	No
F - XX <sup>1</sup>	www.houra.fr	grocery goods	n. a.	national	old / new	No
F - 05	www.achat-grenoble.com	platform for various stores	n. a.	City	new	Yes
GR - 01	Veropoulos Kat'oikon	supermarket products	not operational	City	not known	Yes
NL - 01	<a href="http://ah-thuisservice.ah.nl/hss/shop">http://ah-thuisservice.ah.nl/hss/shop</a>	7000 daily use products	n. a.	National	new	Yes
UK - 01	www.tesco.com	full supermarket range	185	National	new	Yes

n. a. = not available <sup>1</sup> These initiatives are displayed for comparative reasons and do not appear in the “project collection”

**Table 6: Overview on all online-shop examples collected**

Example 5.1: Benelux and UK	<b>Example 5.1: RelayStar (Benelux and UK)</b>  [Quispel; 2001, Dujardin; 2001]
--------------------------------	---

**Key words** **fuel stations, pick-up points, open to all e-shops, limited to motorised customers**

**Framework conditions and objectives** RelayStar is a pick-up point solution for e-retailers and their online customers aiming at solving the last mile delivery problem including reverse logistics. It is a joint venture between the global energy company Texaco and the world's largest express and package carrier United Parcel Service UPS. RelayStar tackles B2C challenges using B2B logistics by combining Texaco's large network of retail outlets with UPS' world-wide expertise in logistics and e-fulfilment. The service is limited to products that weigh less than 15kg. Furthermore products must not be perishable and must not exceed the value of 2000 EUR.

**Approach** RelayStar is using the Texaco fuel stations as delivery / pick-up points for products ordered online at the participating retailer's website. The delivery itself is done by UPS. During the process of delivery the customer is informed about the whereabouts of the ordered goods by means of the package being scanned. Due to the good coverage of Texaco fuel stations in the Benelux and their long opening hours the consumer can easily pick up the package. The whole process is organised as follows:

1. The customer orders the desired products at one of the participating retailers' web-site. He chooses the desired pick-up point among the network of 400 (Benelux) and 600 (United Kingdom) Texaco fuel stations. Thereby, he is assisted by a map based overview on the whole network, giving additional information such as the Texaco station's phone number, opening hours, etc. (see Figure 30). Payments are handled online at the site of the retailer at the time of purchase.

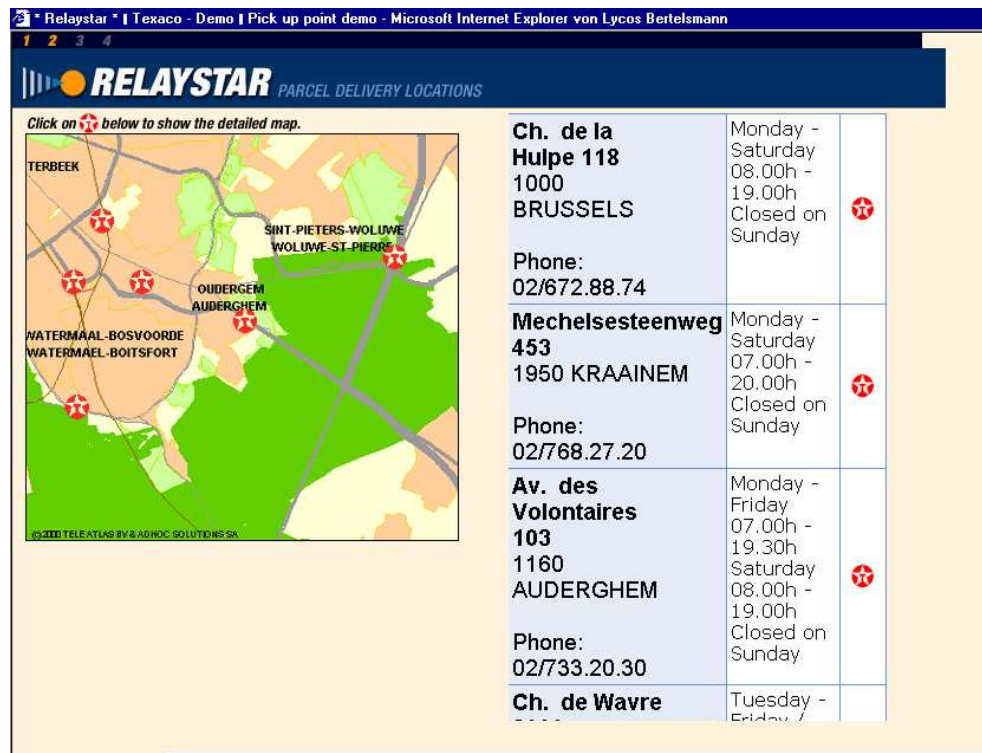
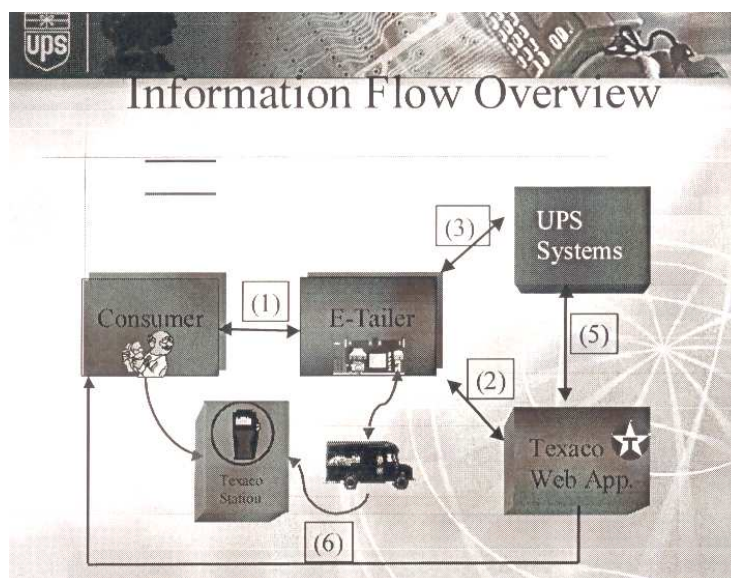


Figure 30: Choice of pick-up point [www.relaystar.com]

2. An e-mail notifies the customer that his order has been registered with the retailer who sends the parcel with UPS. This e-mail contains a link to the customer's own customised tracking page where he can trace the delivery status of his package at any time via the RelayStar tracking system. The package is identified by a unique tracking number and a scanner system.
3. When the package arrives at the Texaco fuel station, the RelayStar manager signs for delivery. A delivery confirmation by e-mail informs the customer that his goods are ready to be collected. The package is fully insured and safely stored for a maximum of 14 workdays until the customer arrives for collection. After 14 days the package will be automatically returned to the retailer.
4. Upon arrival the customer presents the order number mentioned in the confirmation mail and a valid form of identification and picks up his package.
5. The customer can also return the goods via the same pick-up point.

For an information flow overview see Figure 31.



**Figure 31: Information Flow Overview** [Dujardin; 2001]

Results and experiences

RelayStar is currently operational in the Benelux and is being rolled out in the United Kingdom. It is foreseen that in the near future other countries will be added and that other high quality retail networks will be included in the RelayStar solution. Currently four e-retailer are using the RelayStar solution, namely [dvdzone2.com](http://dvdzone2.com) (Media), [redcorp.com](http://redcorp.com) (Computer products), [printclub.nl](http://printclub.nl) and [winesmart.com](http://winesmart.com) (Wine). Six other online retailers are announced to offer RelayStar delivery in the near future.

It is not known how RelayStar influences urban transport patterns. However, by relying on gas stations as pick-up points the projects addresses car users only. Customers of public transport are out of its focus.

More information

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Example 5.2: Germany, Austria, UK	<b>Example 5.2: PickPoint AG (Germany, Austria, UK)</b>  [Huschebeck; 2001; Schubert et al.; 2001; Bischofs / Riemer; 2001; Eichner; 2001]
<b>Key words</b>	<b>integrates different pick-up points, open to all e-shops and customers, network entry barriers, mapping tools for location</b>
Reasons, framework conditions and objectives	<p>The idea for the PickPoint AG was born when its founder, a young and busy business consultant, got sick of always being absent when the goods he had ordered on the Internet were delivered to his home. He therefore founded the company which aims at making life easier for online-shoppers: instead of the customer's home the ordered goods are delivered to nearby pick-up points. Thanks to the long opening hours of these facilities they can be picked-up at almost any time. Also the goods can be paid upon collection.</p> <p>PickPoint is a subsidiary company of the German D.Logistics AG and was founded in June 2000. For the goods transport they co-operate with the logistics specialists DPD (Parcel Service of the German Post), UPS and TNT.</p>
Approach	<p>PickPoint is a delivery, storage and payment solution open to all kind of online retailers. Web-shops can join the system by paying licenses to PickPoint AG. Customers of online-shops that offer the PickPoint solution can choose delivery to the pick-up point of their choice instead of home delivery. After ordering the goods are transported to the desired pick-up point by the logistics partners. The customer gets a notice per e-mail or SMS when his parcel is ready for collection. After 5 days the customer is reminded of collection by another message. If the goods are not collected after 10 days, they are sent back to the sender. The additional costs for returning are charged to the customer. During the delivery process the customer can check the current status of his order (status messages: order processed – parcel being delivered – parcel at pick-up point – parcel being returned).</p> <p>As an additional service customers can also use their preferred pick-up point as delivery address for any other orders, independent from web-shops.</p> <p>Currently there are about 1700 pick-up points all over Germany and 35 in Austria. In the United Kingdom the subsidiary company Collectpoint is operating over 5000 pick-up points. However, more important than the sheer number of pick-up points is their location at the main arterial roads, says PickPoint founder Bischofs. [Eichner; 2001] 80% of all pick-up points are gas stations, others include fitness gyms, video-tape libraries and kiosks. So far, none of them offers special storage facilities e.g. for frozen goods. However, one web-shop is delivering fresh meat in chilled Styrofoam-boxes. Payment</p>

(cash or sometimes credit card) is currently possible at more than 80% of the pick-up points.

The license fees for the PickPoint service are currently between 1.5 and 3 Euro per delivery (depending on size and weight) plus a proportional fee for the payment services similar to the ones charged by credit card companies. These license fees do not include the actual delivery costs. Some web-shops do pass on the license fees to their customer. However, the charges are not a problem for the targeted customer group of busy singles and working couples, says PickPoint co-founder Björn Heyden. [Eichner; 2001]

With their solution the PickPoint AG aims at overcoming various barriers with various actors within the value chain: [Bischofs / Riemer; 2001]

- The client has easy access at almost 24 hours to the ordered goods and does not have to worry about the safety aspects of payment by Internet if he chooses the PickPoint payment option
- For the Web-shop PickPoint handles return flows
- For the parcel delivery company the goods can be delivered at once instead of trying several times when the consumer is not at home. Access to the delivery points is easy. There are no uncertainties about the delivery address. Consignments can be bundled and an efficient delivery round set up.

Results and experiences

According to the PickPoint AG the concept is growing very fast. About 100 additional pick-up points complete the network each month. Currently around 30 web-shops are using the PickPoint service selling all kind of things from music and books to bike components or toys. For some of them more than 30% of their total turnover is made using PickPoint delivery.

For establishing the pick-up point network (as in all networks) network effects have to be overcome. The number of clients and the number of pick-up points are interdependent: the more dense the network of pick-up points and web-shops, the more it is attractive for customers; and the more customer the system attracts the easier it is to convince new web-shops and pick-up points to participate. To lower these entry barriers the initial effort for customers as well as for web-shops should be kept low. On the other hand a more dense network causes higher delivery costs as more points have to be delivered. From the economic efficiency view there seems to be an (unknown) optimum number of pick-up points. Furthermore, the communication of the PickPoint-possibilities in the shops' web-sites and the use of road maps for locating the pick-up points turned out to be crucial.

More information

[www.pickpoint.de](http://www.pickpoint.de)

The PickPoint initiative is described in detail - in German only though - in Schubert et al (2001), p. 160-171.

Member of BESTUFS who did the material collection:  
Marcel Huschebeck, PTV

Example 5.3: Berlin	<b>Example 5.3: Internet House (Berlin)</b>  [Huschebeck; 2001; Morgenpost; 2000; ct; 2000; GSC; 2001]
<b>Key words</b>	<b>dedicated individual delivery infrastructure, 3 climate storage compartment, e-living</b>
Reasons, framework conditions and objectives	Due to excess supply in Berlin's real estate market the real estate company Quadriga AG was looking for new business approaches in order to stand out against its competitors. In 1999 it founded the subsidiary enterprise Q24.net mainly for promoting what they call e-living, a combination of e-commerce and real estate business. A pilot Internet house was to be built by the end of 2000. In case of positive response another 800 apartments should be equipped with the e-living technology.
Approach	In the Internet house all apartments are equipped with Internet communication links and devices. With a password the tenants have access to an exclusive house community e-commerce portal with a wide range of e-commerce offers from grocery shopping to Internet banking. For home-delivery of ordered goods the house is equipped with a special home delivery installation. "In the cupboard-like box in the wall outside the apartment the ordered groceries will await the tenant when he comes home from work at night. The cleaned suit and the freshly ironed shirt are hanging in a separate compartment" explains Quadriga-speaker Antonios Goros. The e-living concepts also includes "intelligent installations" such as light, heating and cooking devices controllable via Internet. A special mobility concept including car-sharing among the inhabitants is also part of the concept. Co-operation contracts with UPS, Colt Telecommunications, Telekom, Siemens, Techem, Smart and Amazon.com have been established.
Results and experiences	It is not known whether the pilot has been built, as the Quadriga AG went bankrupt in 2001 for unknown reasons. However, the approach to provide integrated services and to use specific delivery infrastructure and equipment is very innovative and could have some potential in the future.
More information	Member of BESTUFS who did the material collection: Marcel Huschebeck, PTV



Example 5.4: Dortmund	<b>Example 5.4: Tower24 (Dortmund)</b>  [Huschebeck; 2001; IML; 2001]
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**Key words**

**unattended pick-up and delivery infrastructure, fully automatic, bundling of goods flows**

Reasons,  
framework  
conditions and  
objectives

Due to the atomisation of consignments transport costs have risen disproportionately to the order volume.

This calls for the development of an optimal fine distribution. The present time windows for home delivery of about two to four hours are by far not precise enough. The situation becomes even worse if the customer is not at home at the fixed delivery time. Decentralised pick-up terminals are economically sensible alternatives for the door-to-door delivery. Here, goods flows are bundled up to a suitable location near the customer where he can collect the goods himself. This helps to reduce logistic costs considerably.

In this context the Fraunhofer-Institute for Material Flow and Logistics IML in Dortmund developed a concept for a decentralised pick-up terminal which meets the requirements of the sellers, the logistic service providers and above all of the final consumer. This concept is called Tower24 - fast, secure and reliable.

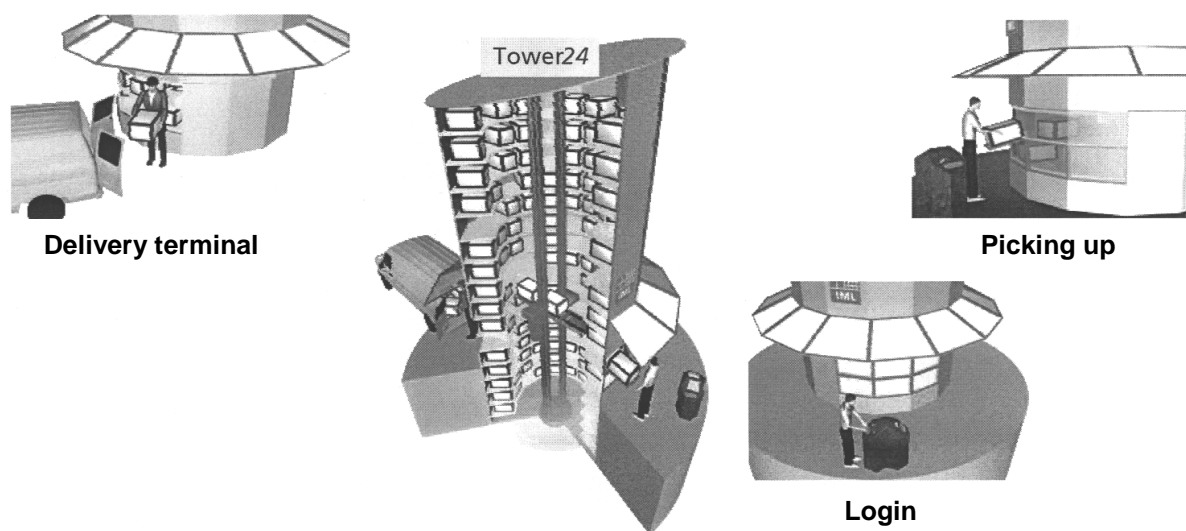


Figure 32: Tower24: delivery, storage and picking-up [IML; 2001]

Approach	<p>The Tower24 concept is a fully automatic storage system for small consignments. The system is open to different suppliers and service providers. The access for supplier and customer is much easier than with conventional locker systems. The supplier can drive his van directly in front of the Tower24 for delivery (see Figure 32). The window for entering the goods is designed in a way that 100 parcels can be stored within 20 Min. The customer is informed by SMS or e-mail about the arrival of the ordered goods. He has a 24-hours “drive-in” possibility to pick up his parcel without leaving the car. As different temperature zones can be generated in the tower, different commodities can be stored from frozen, to chilled and non food goods. The customer pays in front of the tower with bank or credit card or by using his handy. The suppliers are informed about goods that have not been collected. Tower24 also handles returned consignments and empties.</p>
Results and experiences	<p>The main logistic advantage of a pick-up and delivery point system such as Tower24 is that goods flows can be bundled. Tower24 combines quick and cost efficient delivery and picking-up with minimum land use. However there is a certain risk that such towers will mostly be realised at car oriented locations without considering the access to public transport. A disadvantage is that a Tower24 once built cannot be enlarged. There are no real-world experiences with Tower24 so far. A pilot shall be operational in Dortmund in Autumn 2001.</p>
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Example 5.5: Paris	<b>Example 5.5: Magasin de Quartier (Ile-de-France, Paris)</b>  [Dablanc; 2001]
<b>Key words</b>	<b>delivery depots, for both shop keepers and private end-consumers</b>
Reasons, framework conditions and objectives	<p>The “Magasin de Quartier”-project is one of the leading projects on urban goods transport for the Paris region. Its main objective is reducing the number of home deliveries in dense commercial/residential areas of Paris and the surrounding municipalities using local delivery depots. The project has been proposed in the regional transport plan of 2000. The first delivery depots are planned to open not before end of 2002, with a possible involvement of Paris CCI, transport operators and public governments.</p> <p>Demand for such an initiative is coming from two sides:</p> <ul style="list-style-type: none"><li>• Demand by transport operators who fear an increase in home deliveries and subsequent problems (delivery hours, closed doors, stairs, etc.)</li><li>• Demand by public institutions (City of Paris, Regional Council) in order to alleviate traffic congestion due to commercial traffic and deliveries in dense areas.</li></ul>
Approach	<p>Magasins de Quartier are drop-off zones for transport operators delivering parcels ordered by any kind of communication means: mail order, telephone, fax or Internet. The local delivery depots are small scale terminals (no more than a few hundreds m<sup>2</sup>) and are located in dense commercial or residential areas. Each could be operated by 2 or 3 full time employees. The local delivery zones will be opened from early in the morning till late in the evening. Carriers will be able to leave parcels and goods in this depot instead of delivering them all the way to their clients (whether shop keepers or households). Clients will then be informed about the availability of their products. They either come and pick them up themselves or the employees of the Magasin de Quartier will deliver them at an extra cost. From the Magasin de Quartier the delivery to the client will be very short distance making it possible to deliver without motor vehicle.</p> <p>The special thing about Magasins de Quartier is that they should service both private (end-)consumers as well as (retail-)shop keepers.</p>
Results and experiences	<p>The project has not been implemented yet. But the experiment is strongly supported by transport companies and their organisations.</p>

More information

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Example 5.6:  
Brussels and  
surroundings

### Example 5.6: Caddy-Home (Brussels and surroundings)

[Van Isacker; 2001; [www.caddyhome.be](http://www.caddyhome.be)]

Key words

**online supermarket, time-slot delivery, pick-up point with short time parking in the city centre**

Reasons,  
framework  
conditions and  
objectives

Caddy-Home is the online-supermarket of Delhaize, one of Belgium's main supermarket chains. The initiative started already 14 years ago, at that time based on telephone and fax. Deliveries are made in and around Brussels.



**Figure 33: Caddy-Home home delivery service**  
[[www.caddyhome.be](http://www.caddyhome.be)]

Approach

New e-shoppers on the site need to fill in a form to become clients of Caddy-Home. They are then provided with a client number and a password.

Once the client number and the password are received, the customer may order products by telephone, fax, or via Internet. He may choose among thousands of products sold in the Delhaize "Le Lion" supermarkets.

Purchased products are delivered to the customer's home. Delivery is charged at a flat rate of ca. 7 Euro. The day and time of delivery may be chosen by the client at the time of order. Caddy-Home immediately confirms

if there is still place in the desired delivery round. If it is not the case, the customer is requested to select another delivery time. Caddy-Home organises four delivery rounds on week days (9 a.m. to 12 a.m., 12 a.m. to 2 p.m., 3:30 p.m. to 5:30 p.m. and 6 p.m. to 8:30 p.m.) and two delivery rounds on Saturdays (9 a.m. to 12 a.m. and 12 a.m. to 2 p.m.). Returnable bottles bought at Caddy-Home are collected on the next delivery

Payment is made to the delivery man by cash, check, bank card or lunch vouchers (private customer) or by cash or check (companies) respectively. Companies that wish to do so may request to receive invoices to be paid within the following 8 days.

A new service called “take ‘n go” has just been set up. To use this service one also needs to have a client number and a password. Orders may be made via Internet, by telephone, or by fax before 10 a.m. The prepared order may be retrieved between 4 p.m. and 7 p.m. in the centre of Brussels, next to the new “Manhattan” Delhaize City. A “short time parking” has been organised to facilitate pick-up of orders.

Results and experiences

Caddy-Home is used by around 400 clients per day. The online-shop’s turnover grew from 8.8 million Euro in 1999 to 10.8 million Euro in 2000. However, it is not known whether the business is profitable or not. Its effects on urban freight or passenger transport have not been assessed.

More information

[www.caddyhome.be](http://www.caddyhome.be)

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Example 5.7:  
Switzerland

### Example 5.7: LeShop (Switzerland)

[Glücker; 2001; Egger; 2001; www.leshop.ch]

#### Key words

**online supermarket, no brick-and-mortar shops affiliated, targeting working parents, insulated bags for fresh products, dedicated warehouse, time-slot delivery, non-timed delivery, delivery to neighbours**

#### Reasons, framework conditions and objectives

LeShop was the first online grocery service to be established in Switzerland and is still the only online-supermarket in Switzerland without affiliated brick-and-mortar shops. The service is targeted to working people, especially women, who have to manage both family and job.

LeShop.ch aims to establish itself as the No. 1 Swiss online food market by adapting its service offering to customer needs, expanding its product range, ensuring top quality standards for all products and services, upgrading its web-site functionality and systematically implementing its one-to-one marketing concept.

LeShop went online in April 1998. Today it is part of the Bon appétit group. LeShop delivers throughout Switzerland and Liechtenstein.

#### Approach

LeShop offers over 4500 products to meet daily requirements including fresh fruit and vegetables, meat and dairy food as well as non-food. The prices of the products are comparable to the ones at brick-and-mortar shops with a similar selection. However, the focus is on rather expensive high-quality products with high margins. [Metzger; 2001] The ordered products are delivered to the customer's home (or any other address specified) throughout whole Switzerland and Liechtenstein by the logistics partner, the Swiss post parcel service. There is a flat fee of 8 Euro per delivery. All products are carefully packed in paper bags. Temperature-sensitive fresh products are kept cool by insulated bags. For these a deposit of 3 Euro per order is charged which will be credited to the customers account when returning the bags. The paper and insulated bags are transported in padded plastic boxes which the postman takes with him after delivering the order (see Figure 34).



**Figure 34: Shipping boxes (“Dispoboxes”) [www.leshop.ch]**

For major Swiss cities (Aarau, Basel, Berne, Frauenfeld, Geneva, Lausanne, Lucerne, St-Gall, Winterthur, Zug and Zurich) there is an express night delivery service: all orders placed on Sundays through Thursdays before midnight are delivered the following day between 5:30 p.m. and 8:00 p.m. Orders placed on Friday before 4:30 p.m. are delivered on Saturday morning. For other areas of Switzerland all orders placed on Monday through Friday before 4:30 p.m. are delivered the next working day between 07:30 a.m. and 4:00 p.m. (including Saturday).

If the customer is not at home at the time of delivery the goods are proceeded according to the customer’s specifications made at the time of ordering. The postman then:

- leaves the goods at the front door
- leaves the goods with a particular neighbour
- returns the goods to the post office where they can be collected (during regular opening hours)





**Figure 35: LeShop products are delivered by the postman  
[[www.leshop.ch](http://www.leshop.ch)]**

With rising turnovers the logistics challenges have become more and more complex. LeShop have therefore decided to take care of this important part of the value chain themselves. Since August 2001 all logistics operations are concentrated in the new logistics centre in Bremgarten. The centre is operated by 30 employees working weekdays from 06:00 a.m. to 10:00 p.m.. It is served by 60 suppliers, whereof 11 deliver daily (fresh products such as fruit, cheese, meat). Over 4500 different products are stored on 1600 m<sup>2</sup> (chilled) or 4200 m<sup>2</sup> (ambient) respectively. Each day 200-400 orders are processed, resulting in 9 tons of products in 800-1600 of the yellow delivery boxes being delivered everywhere in the country. 80% of the orders are delivered using the express service. The logistics centre is especially designed for the needs of an online grocery supermarket. All products are sorted by shelf turnover, packing sequence and requirements. The single-pick storage system enables LeShop to select and place each product in the shipping boxes individually. This manual work is supported by automated processes: first the system auto-distributes the incoming orders to packing zones. Instead of warehouse staff walking through the aisles with shopping trolleys, the shipping box makes its way to the appropriate packing zones via 700 metres of conveyor belts (see Figure 36). In this way, LeShop.ch packers process an order simultaneously at different positions, so that products are boxed up more quickly. Thus the design of the entire logistics centre is geared to the needs and buying habits of the customers

LeShop's main target group are young families and working mothers. The company's partnership with The association of the Swiss Business

Professional Women BPW aims at intensifying this focus.



**Figure 36: Picking process using conveyor belts in LeShop's dedicated warehouse [www.leshop.ch]**

Results and experiences

LeShop started in 1998 with 7 employees. In April 2001 the total number of staff was 40 people. 16'000 customers have shopped at least once with LeShop so far. Today, 76% of all purchases are made by regular clients, mainly for their planned weekly shopping. LeShop handles 200 to 400 purchases per day, mostly on Mondays. Average shopping basket value is around 100 Euro. LeShop received several awards as best e-commerce site in 1998 and 1999.

Whereas total turnover in 2000 was 4.5 million Euro, this figure is probably almost going to double in 2001 (3.7 million Euro in the first semester). However, total sales have to reach around 50 millions for the business to be profitable. [NZZ; 2001] Whether this can be achieved within the planned next years depends mainly on customer acceptance and on competitors.

More information

[www.leshop.ch](http://www.leshop.ch)

Member of BESTUFS who did the material collection:  
Claudia Glöcker, Dieter Egger, RAPP AG

Example 5.8: Switzerland	<b>Example 5.8: MIGROS-Shop (Switzerland)</b>  [Glücker; 2001; Egger; 2001]
<b>Key words</b>	<b>Online supermarket, price differentiation, ecological concerns, electric bicycles</b>
Reasons, framework conditions and objectives	The MIGROS-Shop is the online supermarket of MIGROS, the biggest supermarket chain in Switzerland. The whole MIGROS co-operative includes not only supermarkets but also gas stations, banks, insurance, travel offices, etc. The MIGROS-shop online initiative was started in 1998 as a (small) complementary part of the brick-and-mortar business.
Approach	<p>The MIGROS-online shop offers around 4000 articles including food from the whole range of goods in traditional MIGROS supermarkets. Prices are identical with the ones in the brick-and-mortar outlets. The goods ordered by Internet are delivered or can be picked up at the bigger supermarket outlets. The delivery service is restricted to confined regions within Switzerland. All goods are delivered from the MIGROS-shop centre in Schönbühl. The goods are delivered in reusable boxes that are taken back immediately after delivery. Orders made before 10 a.m. are delivered the same day, otherwise the next working day. The customer can choose between two delivery services:</p> <ul style="list-style-type: none"><li>• Standard delivery service: Delivery within time-slots, either 16:00-17:30 or 17:30-19:00 (at the customer's choice).</li><li>• De Luxe delivery service: Delivery on appointment, any specified time between 16:00 and 22:00.</li></ul> <p>The fees vary according to the chosen service and the ordered amount:</p> <ul style="list-style-type: none"><li>• Picking-up the goods at a specified supermarket: free of charge</li><li>• Standard delivery service: 10 Euro for total orders below 130 Euro, and 8 Euro for orders above 130 Euro</li><li>• De Luxe delivery service: Flat rate of 23 Euro.</li></ul> <p>Payment is possible by Credit Card or PostCard. If the customer is not at home during delivery the goods are left in front of the door at the customer's full responsibility. In residential blocks the goods are generally delivered up to the main front door, but exceptions can be arranged.</p>
Results and experiences	There is no information available about the economic success of the initiative. The company is aware that "the current distribution concept and

the increase of small quantities cause more traffic.” [MIOSPHERE; 2001] “In order to improve the negative ecological effects of transport” [MIOSPHERE; 2001] and to green the company’s image an optimisation of the distribution concept is currently undertaken. As the new concept is still under construction access to information is restricted. The new distribution concept will “enforce the use of pick-up-points which are easily accessible (e.g. MIGROS gas stations, railway stations, airports, big companies, etc.). ... The main goal is to avoid as many client-trips to the shopping centres as possible and to avoid an increase of traffic in general.” [MIOSPHERE; 2001] It is possible that the new concept will even include the “Service Porteur”, a service, which has been tested recently in a small scale pilot, offering home delivery by electric bike and trailer for goods bought conventionally at the supermarkets (see Figure 37).



**Figure 37: Bike trailer for home-delivery by the “Service Porteur”**

More information

[www.migros-shop.ch](http://www.migros-shop.ch)

Member of BESTUFS who did the material collection:  
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Example 5.9:  
Nanterre

### Example 5.9: PAD Nanterre (Nanterre)

[Dablanc; 2001]

Key words

**Home delivery and taxi service, offline ordering, depends strongly on public subsidies**

Reasons,  
framework  
conditions and  
objectives

The Nanterre Portage et Accompagnement à Domicile (PAD, i.e. Home Delivery and taxi service) was the first of PAD projects throughout French Cities (including Paris) and the largest so far (number of shop keepers associated and number of deliveries made). The public-private experiment has started in 1998 and should continue if more subsidies are found. It is financed by its members (20% of the budget) and by the Ministry of Transport and other public and private sources (National Research Program on Urban Goods). It was initiated by Mr. Creuzet, the President of the Nanterre Association of local retailers and craftsmen because the traditional city centre shops were losing customers and because there was a strong environmental need to decrease shopping trips by private car. The projects is operating in the city-centre of Nanterre, a city with 100'000 inhabitants in the Paris region.

Approach

150 shopkeepers are member of the Nanterre PAD experiment. The project employs 6 persons who pick-up the goods purchased at PAD member shops and deliver them to the customer's home. Goods are either bought by physical visits in the shop or ordered by phone. For example a customer calls a liquor store which is a member of PAD. He orders 10 bottles of wine to be delivered within the next hour. The wine merchant will then call the PAD centre and ask for a delivery service. The PAD employee comes with an electric motorcycle or an electric car, picks up the wine box and delivers it to the customer. The customer is charged 1.5 Euro per delivery. The PAD centre centralises all demands and tries to organise a delivery tour in order to rationalise the use of their vehicles. However, as they have committed themselves to delivery within one hour they often cannot wait for a tour to be completed. Ordering by Internet is planned but not possible yet.<sup>1</sup>

Customers can also ask for a taxi service, i.e. a ride. A car then picks up the customer at his home and takes him to a shop or another service provider such as a hair dresser, etc. Shop keepers pay for part of that service, their customer so far do not pay anything.

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<sup>1</sup> The Nanterre PAD project is therefore not exactly an e-commerce example. It is nevertheless described as it deals with the last mile delivery problem.

Results and  
experiences

The PAD centre executes around 100 deliveries and 20 rides a day. This is considered a success. However, financially, the PAD does not manage to be profitable without public subsidies. According to the initiator, Mr. Creuzet, "a PAD will always need at least a 25% subsidy rate from the public sector", and it is an environmental choice to be made by environmentally concerned municipalities. However, the environmental impact of the Nanterre PAD experiment are not obvious and is therefore being evaluated. There are no results available yet.

More information

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Example 5.10:  
Switzerland

### Example 5.10: ServiceLog (Switzerland)

[Glücker; 2001; Swiss Post; 2001]

#### Key words

**B2B e-commerce, sending and exchanging faulty equipment**

Reasons,  
framework  
conditions and  
objectives

ServiceLog is a logistic solution of the Swiss Post's parcel service. The Swiss Post currently has 3500 post offices nation-wide with 55'000 employees. On average about 600'000 parcels are processed every day.

ServiceLog offers logistics solutions for sending and exchanging faulty equipment to companies in the computer, electronics, telecommunications and related sectors and their customers respectively.

Approach

With ServiceLog the whole repair process, from receiving the faulty equipment to sending it out following repair, can be completed in just a few days. Items are sent via the quick PostPac Priority service. A possible example of the proceedings is given on the next page (Figure 38).

There are different options depending on whether the company uses their own containers or the so called "Dispoboxes" of the Swiss Post, whether the faulty equipment is collected at the customer's home or deposited at the nearest post office, etc. It is also possible to have a spare equipment delivered to the customer (when collecting the faulty one) and collect it again (when delivering the repaired one). Other services such as Call Centre are available for an additional charge. There is a minimum quantity of 1000 orders per year.

Results and  
experiences

The ServiceLog service is currently used by 18 companies. The project was awarded by the Swiss Association for Logistics as one of the best logistic solutions of the year 2000. However, there is no information available on the impact on urban freight.

More information

[http://www.post.ch/e/parcel\\_post/gk\\_loe\\_servicelog.html](http://www.post.ch/e/parcel_post/gk_loe_servicelog.html)

Member of BESTUFS who did the material collection:  
Claudia Glücker, RAPP AG



The customer calls to say a piece of equipment is faulty.  
The company notifies the ServiceLog centre by mail.



The postman is sent to the customer's home with an empty container.

At the customer's home the postman packs the faulty equipment into the container.



ServiceLog delivers the container to the company for repair.

The repaired equipment is handed back to ServiceLog in the same packaging for the return journey.



The postman delivers the parcel to the customer.

The postman hands the repaired equipment over to the customer.



The empty container is returned to the ServiceLog centre.

**Figure 38: The ServiceLog process [Swiss Post; 2001]**



## 5.4 The logistics of online-shopping solutions

Integrating data flows

Online-retailer should aim at implementing an IT-architecture that enables a real-time integration of the various systems of his business partners. If the online-order of a toy for 25 Euro is to trigger a just-in-time order at the wholesaler's plus instructions for wrapping it in gift paper at the distributor's plus an order at the parcel service, this can only be profitable within fully integrated systems. Also tracking & tracing as well as complaint management require integrated solutions. Demand peaks (such as Christmas shopping in the toy industry) would cause the breakdown of a manual system. [Schubert et al.; 2001]

2 logistics models for assembly

With online-shopping business models two logistic models for assembly are observed (see Figure 39 and Figure 40):

- locating logistics operations at existing stores (shelf-picking)
- locating logistic operations at dedicated centres which are especially designed for e-commerce operations (e.g. using conveyor belts, storage according to buying frequency, packing order and storage needs).

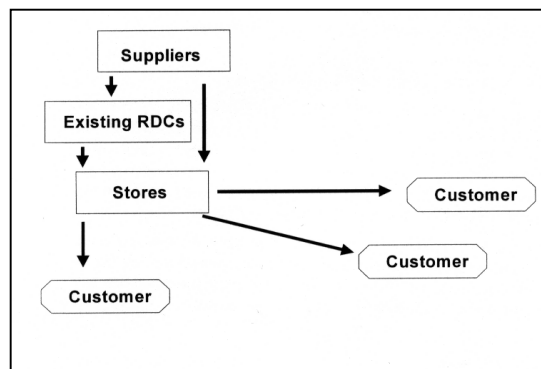


Figure 39: Store-based picking model [Browne; 2001]



goods are delivered to a previously specified neighbour. Other consumers prefer to have the goods left unattended in front of their door - at their own risk of course. For smaller items such as books or CDs (still the online best-sellers) Swiss letterboxes dispose of a bigger extra compartment, the so called "milkbox". These compartments are not locked, but apparently theft is not a problem so far.

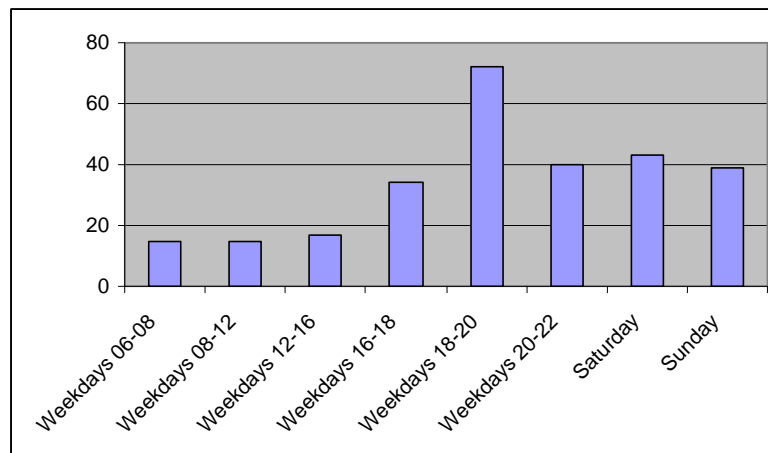
Although non-timed delivery comes along with various problems it allows delivery companies to optimise transport routes and schedules, thereby reducing overall traffic and achieving better vehicle and driver productivity for each unit delivered. Two studies in the UK modelling a home delivery service found that vehicle kilometres for trips previously made by now home shoppers could be reduced by around 80%, even if each delivery van only carried eight loads of shopping. [Cairns and Farahmand/Young quoted in Browne; 2001]

Delivery by  
appointment

To avoid the consumer-at-home problem some companies deliver by appointment. However, this advantage is traded against a loss of efficiency, as it is difficult to set up efficient delivery tours. In the worst case there is a single delivery trip for each order, thus private shopping trips are just replaced by reversed commercial delivery trips.

Time-slot delivery

Time-slots try to combine the advantages of both non-timed delivery and delivery by appointment respectively. However, capacity problems might occur as there are apparently preferred time windows. As shown by Figure 41 most consumers prefer their products being delivered on weekdays between 8-10 p.m.. This is also peak parking hour in residential areas, creating additional delivery problems.



**Figure 41: When people want their products delivered**  
[Hultkranz / Lumsden; 2000]

Workplace delivery

Delivery to the workplace solves the problem of the presence of a receiver, but it might create storage problems at the office, especially for frozen and chilled goods and even more with increasing popularity. With regard to transport patterns workplace delivery transfers the last mile distribution problem to the work-home journey. This might influence the modal choice of workers, as they might go to work by car instead of public transport in order to take the delivered goods to their homes.

Delivery to pick-up points

The delivery to pick-up points where the consumer comes to pick up his goods after notification of arrival offers several advantages with respect to the above mentioned problems. The goods are 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. Pick-up points guarantee secure storage under stable temperature conditions. Pick-up points can be dedicated local urban delivery centres (see Example 3.4: Tower24) or use existing infrastructure such as petrol stations (see Example 3.1: RelayStar), local stores, park & ride sites, leisure facilities, schools, rail stations, etc. (see Example 3.2: PickPoint AG). The different solutions also have different characteristics and implications on transport pattern. Pick-up points which combine the activity of picking up the ordered goods with an existing activity or trip offer a potential to reduce overall traffic, although they might shift the modal choice of these activities towards private cars. This is especially true for car oriented solutions such as gas stations, which are attractive for motorised citizens only. The picture is different where the goods are picked up at retail stores or at dedicated pick-up centres. These

solutions offer no or less potential to reduce traffic as their main customer service is not delivery but product assembly and flexible opening hours. They could only contribute to traffic reduction if different orders at different retailers are assembled at the pick-up point, i.e. if the consumer's single trip to the pick-up point would replace several shopping trips to different stores.

Extra challenge:  
food delivery

A particular challenge are the logistics of food delivery, especially when it comes to fresh products such as meat or dairy food that need constant cooling. An active cooling chain (delivery vehicle with freezing compartment) allows longer transport trips and fully supports frozen goods, but it requires high investment costs and is usually not offered by the general logistics and transport companies. That's why many online food-retailers use insulated containers instead (passive cooling chain) in spite of the inconveniences: transport times are limited, the containers require reverse logistics, the insulation takes extra space and frozen goods can only be transported within limits.

Also on the receiver's side special infrastructure is required for storing the goods under the necessary temperature conditions, whether it is at pick-up points (see Example 3.4: Tower24) or at the consumer's home when he is absent (see Example 3.3: Internet House).

Return flows

Reverse logistics in order to handle return flows are often neglected. Fear of damaged goods and the according return hassles can be a major inhibitor for consumers to shop online. [CREDOC; 2001] Without proper organisation they can create a lot of inefficient transports and upset customers.

Delivery fees and  
transport efficiency

Delivery fees are often not covering the actual logistic costs as companies are afraid of repelling new customers by high delivery fees. The problem is related to the still limited online sales. For acceptable delivery costs and prices the volume and the number of deliveries have to attain a certain threshold. Still, the costs associated with order picking and home delivery are not new costs. It is rather that these activities and costs are transferred from the customer to the e-commerce company. In fact, it may well be the case that order picking and transport costs are lower when performed by an e-commerce company than when carried out by the consumer (especially when taking into account the customer's value of time). The concern for the companies is whether the customer is willing to pay a price that fully covers the costs of these activities. Without appropriate delivery charges that also reflect the quantity ordered and the speed of fulfilment there may well be a rapid increase in vehicle trips involving the delivery of minimal quantities of goods. [Browne; 2001] In fact, in times of the "polluter pays"-principle and road pricing flat delivery rates look like an anachronism. With a future increase in e-commerce activities customers will react more sensitively on

delivery prices. Prices should therefore be used as a demand management tool to bundle orders and increase transport efficiency (see Example 3.8: MIGROS-shop).

Sensitive residential areas

Home delivery usually takes place in sensitive residential areas. Companies could work together to consolidate deliveries for particular streets or areas, thereby improving vehicle load factors, increasing drop densities and reducing the number of vehicles. This would benefit the company (higher efficiency), the customer (lower delivery costs) as well as the other residents (less traffic). Furthermore, co-operative delivery systems for consolidation among various companies would also solve the inconvenience to the consumer when disturbed by several deliveries a day. However, experiences with City Logistic concepts and other co-operation approaches suggest that such a collaboration is tricky and might cause problems of logistics, cost accounting and distribution among the partners.

Opportunities and risks for logistic service providers

E-commerce has strong impacts on the transport service industry:

- Change in demand patterns
- New opportunities for efficiency gains
- Rising importance of logistics within the value chain

E-commerce business solutions require different logistics than traditional businesses, from Just-In-Time orders with smaller consignments at higher frequencies to home delivery services with dedicated e-fulfilment centres.

On the other hand e-commerce offers the opportunity to realise efficiency gains through closer collaboration between logistics service providers and their clients as well as among the logistics companies themselves.

Finally, logistics become a key factor of success for e-commerce business models, even more than with traditional businesses. This gives logistics service providers a strong position and the chances to increase their share of the value chain. E-commerce requires high quality logistics which are only possible through close collaboration. This offers the opportunity to escape the fierce price competition by establishing long-term contracts and business relations. However, with logistics becoming a core business in the value chain e-retailers will try to integrate logistics into their own business in order to keep control of this important process. Nevertheless, the existing know-how of logistics service providers will be needed and appreciated.

A chance for innovative logistic service providers

From the above said e-commerce is rather a chance than a threat to logistic service providers. Particularly in the light of the fierce competition among logistic companies innovative actors can distinguish themselves from their competitors by adapting to the new needs of the e-economy and by making efficient use of the hereby offered opportunities. Because the new economy's logistics are very complex they are difficult to imitate for

competitors. The established market advantages of the innovators will therefore be quite sustainable. [Schubert et al.; 2001]

## 5.5 Possible effects on urban freight and passenger transport

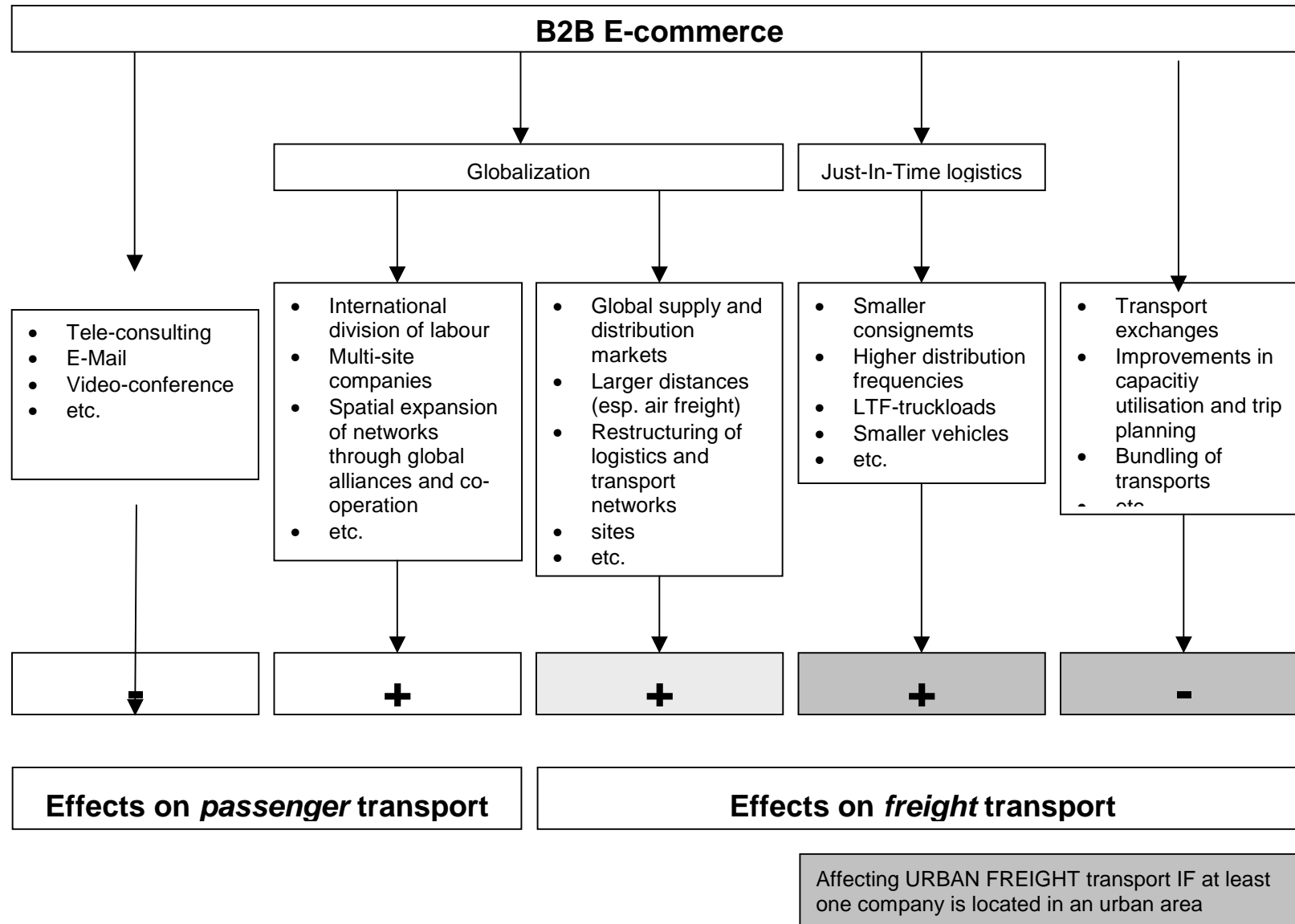
B2B e-commerce:  
general impacts on  
transport

The importance of B2B e-commerce is estimated to grow further in the future. Figure 42 gives an overview on its possible main impacts on passenger and goods transports. With regard to freight transports 3 effects are dominating:

- Close horizontal and vertical collaboration leads to real-time demand and just-in-time logistics. Business clients make their orders at shorter notice and more frequently, nonetheless expecting punctual deliveries. This makes bundling of deliveries more difficult. Smaller consignment sizes are delivered more frequently.
- Global procurement and collaboration leads to larger transport distances and an increase in especially air freight.
- The emergence of supply chain communities and e-based platforms for logistics (e.g. transport exchanges) could lead to greater transparency which would increase competition and offer opportunities to consolidate orders and enhance vehicle capacity utilisation. Traffic volume and freight costs could be reduced.

Whereas the first two effects induce more freight transport, the third could reduce it through rationalisation and efficiency gains. With special attention to *urban* freight transports the first and the third effect are of particular importance, i.e. transport induction through demand for JIT-logistics versus efficiency gains through e-collaboration. Which effect will overweigh in the end is hard to predict. The mentioned problems with regard to collaboration between logistics service providers however indicate that at least in the short-term the transport inducing mechanisms will be dominating. B2B e-commerce does have an impact on *urban* freight distribution if at least one of the trading companies is located in an urban area. Still, the potential for overthrowing existing urban transport patterns of B2C-e-commerce is estimated to be much higher.

**Figure 42: Impacts of business-to-business E-commerce on transport volumes**





B2C e-commerce:  
general impacts on  
transport

The logistics of B2C-e-commerce are characterised by the following particularities:

- Online-shopping is not constrained to local areas. Global shopping increases transport distances and mileage.
- Single orders reduce consignment sizes
- Generally the orders are executed at once thereby increasing delivery frequency
- Several individual shopping trips can be replaced by a single delivery trip by van

Whereas the first three effects forecast an increase in urban freight traffic, the latter offers considerable potential for total mileage reduction.

Several influencing  
factors

The net effect is not clear at all, as the transport reduction potential depends on several factors:

- ability to consolidate orders
- transport bundling capacities (collaboration among various deliverers)
- intelligent trip planning (immediate delivery, access restrictions, time constraints, etc.)
- location of the distribution depot (dedicated warehouse, store)

Furthermore it is expected that consumers will substitute their former shopping trips by possibly even longer leisure trips. Experts forecast that this traffic inducing effect might easily outweigh the whole transport reduction potential and that e-commerce will increase the total number of vehicle movements. [Schacke; 2001] Delivery to workplaces or pick-up points where the very last mile distribution is done by a regular consumer's journey might also influence the consumer's modal choice adversely.

More traffic due to  
e-commerce ?

It is impossible to give a general statement about the impact of online-shopping on urban transport volumes. A wide variety of different logistic solutions have been implemented, each of them having different effects. Transport patterns differ strongly between new or existing logistic channels or between home delivery services and pick-up point solutions. Two identical online shopping models differing only in the location of their pick-up points (e.g. dedicated pick-up centre versus railway station) will have different impacts on transport mileage. Table 7 sketches a picture of the variety and complexity of the different impacts.

**Table 7: Different logistic solutions for various online-shopping models and their impact on transport volumes**

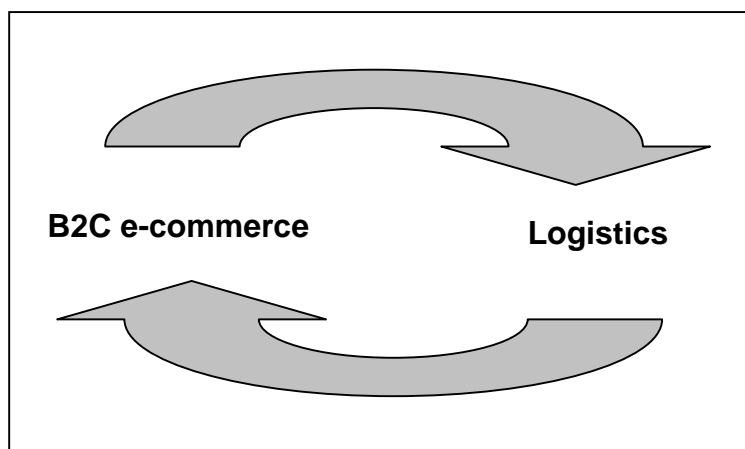
<b>General trend</b>		
E-commerce reinforces the general trend in logistics towards smaller consignments, single orders and thus higher delivery frequency		
<b>Logistic models</b>	<b>transport increasing factors</b>	<b>transport reducing factors</b>
	<b>+</b>	<b>-</b>
Use of existing logistic channels (Parcel service, post)	+ larger distances and higher mileage due to global shopping and single order processing	- better bundling and trip optimisation thanks to large volumes of goods
New logistic channel: shelf picking	+ only restricted bundling possibilities	- shorter distances for last mile distribution (making it possible to deliver e.g. by bike)
New logistic channel: dedicated warehouse	+ higher freight mileage because new distribution centre has to be served  + possibly large distances to pick-up points and homes	- better consolidation and trip optimisation
distribution to pick-up points (including workplace)	+ higher freight mileage due to high number of pick-up points  + possible influence on modal choice (might use car for work-journey instead of public transport)  + consumers might substitute former shopping trips by other (longer) journeys	- replacement of shopping trips if pick-up point is at a location regularly visited anyhow (e.g. workplace)  - better consolidation and bundling if delivered to central pick-up points  - trip optimisation as delivery can be at any time of the day  - assembly of different orders at the pick-up point (replacing a number of single shopping trips)
home delivery	+ higher freight mileage (replacing shopping trips)  + consumers might substitute former shopping trips by other (longer) journeys  + reverse logistics	- replacement of individual shopping trips by bundled goods transports  - potential in overall traffic reduction depends on ability to bundle transports, set up efficient delivery trips and make full use of vehicle capacity (time constraints, etc.).

There could be a net benefit for the public, i.e. less traffic, if a high level of freight vehicle utilisation can be achieved and if former private shopping trips are not substituted with other car-related activities. There has been no study so far assessing all the above mentioned effects quantitatively. Furthermore, it is not clear, which logistics solution has got the highest potential for traffic reduction. Still, experts forecast an increase in overall (urban) traffic, [Vastag; 2001] mainly because of substitution effects. Even the e-commerce companies themselves are aware that online-shopping concepts can increase traffic, depending on their design. MIGROS, online retailer and one of the most important supermarket chains in Switzerland admits: "The current distribution concept and the increase of small quantities cause more traffic. The further development of the MIGROS-Online-Shops will include an optimisation of logistics. (...) The main goal is to avoid as many client-trips to the shopping centres as possible and to avoid an increase of traffic in general." [MIOSPHERE; 2001]

The key question is, whether the online-shopping market will grow to such an extent that the delivery density will be high enough to make the average trip length per delivery substantially shorter than the corresponding private shopping trip. However, the future development of the online-shopping market is hard to predict.

Future  
development hard  
to predict

Whether online-shopping models become a widespread success depends on marketing factors such as consumer habits, technical factors such as electronic payment facilities and last but not least on intelligent and cost efficient delivery solutions, particularly for the "last mile" delivery to the customer. An Ernst & Young study on online retailing puts it like this: "Shipping costs are the biggest concern for online-buyers; it ranks as the number one factor discouraging online buying and the number-one reason for abandoning a shopping cart". [Ernst & Young; 2001]. At the same time consumers get more time-sensitive as they expect the delivery being as immediate as their ordering in the Internet. In other words: innovative logistic concepts are key drivers for the success of B2C e-commerce. On the other hand, the design of these logistic concepts depends again on the development of the online shopping activities themselves. An increase in Internet shopping activities will require other logistic solutions than today's level of home shopping. Logistics and e-commerce form a full circle, each triggering the other's development (see Figure 43). This interdependence is one of the main factors complicating the prediction of future e-commerce development.



**Figure 43: Interdependence of B2C e-commerce and logistics**

Additionally, the future of online-shops depends heavily on the reaction of the brick-and-mortar shops towards this new competitors. Traditional shops will have to play all their trump cards such as entertainment shopping, high level advice, personal contact, etc. in order to stabilise and enhance their customer relationship. The recent trend towards retail stores which combine shopping with video watching, reading, having coffee or surfing the Internet can be seen as a reaction to the competition emerging from e-commerce. However the competition evolves in detail, the question is not whether e-commerce will grow, but rather up to which level.

## 5.6 Conclusions and recommendations

### 5.6.1 Conclusions

Small but fast growing market

Although B2C e-commerce still accounts for a very small market share compared to conventional retail business, the online shopping market is growing very fast. It is heavily pushed by its actors, but so far economically sustainable examples are scarce. In this high potential market efficient and reliable logistics are one of the main factors of success.

Trade-off between customer service and distribution efficiency

There are different logistic approaches used, differing in customer service quality as well as in transport efficiency. Therefore the Internet shops have to find the balance between comfort for their clients (customer service quality)

and efficiency of the distribution process.

Two assembly models

On the level of assembly two logistic models are observed:

- locating logistic operations at existing stores (shelf-picking)
- locating logistic operations at dedicated centres which are especially designed for e-commerce operations (dedicated warehouse picking using conveyor belts, storage according to buying frequency, packing order and storage needs, etc.).

Last mile delivery

For the delivery on the last mile there is a trade-off between customer service and efficient delivery tours:

- Non-timed home delivery and the delivery to pick-up points allow the setting up of more efficient delivery trips but are less consumer friendly than delivery on appointment
- Time-slot delivery is a common approach for balancing the two extremes
- From the city transport planning view it is rather undesirable that pick-up points and delivery depots are often car-oriented (gas stations, etc.)
- Delivery depots and dedicated pick-up and delivery centres additionally allow the bundling of goods.

Consumer-at-home problem

The problem of the consumer not being at home at the time of delivery is tackled in various ways:

- delivering on appointment
- defining time-slots for delivery
- delivering to pick-up points
- equipping (new) houses with special storage infrastructure

Demanding logistics

Efficient and reliable logistics are a key factor for the economic success of online-shopping. But the logistics of online-shops are very demanding. The following particularities have been identified:

- Food delivery: The delivery of fresh products requires special measures for cooling during the delivery process as well as on the receiver's side (at pick-up points or at the consumer's home when he is absent).
- Reverse logistics: Logistics for handling return flows are often neglected, although the fear of return hassles can be a major inhibitor for consumers to shop online.
- Delivery fees: Delivery fees are far from reflecting actual delivery costs

(still small volumes, barrier to customer acceptance, etc.). Differentiated delivery tariffs mirroring the quantity ordered and the speed of fulfilment could help in bundling the orders and increasing transport efficiency.

An opportunity for logistics service providers

E-commerce is rather a chance than a threat to logistic service providers. Particularly in the light of the fierce competition among logistic companies innovative actors can distinguish themselves from their competitors by adapting to the new needs of the e-economy and by making efficient use of the hereby offered opportunities.

Influence of (e-commerce related) legislation

Product-related legislation and vehicle operating legislation on international, national and local level influence the development of e-commerce, especially on certain distribution channels and systems, e.g. [Browne; 2000].:

- Time at which deliveries can be made (both in terms of vehicle access to the street concerned and unloading regulations in force on the street, e.g. night deliveries)
- Times at which customers are permitted to visit pick-up points to collect their goods
- Size and/or weight of vehicles that can be used to make these deliveries
- Special legislation concerning contracts of sales or liability
- Data protection
- Food legislation (Packaging, temperature control, etc.)

Insufficient knowledge about the impacts on urban transport

As online-shopping usually implies the delivery of goods, the growing e-commerce market has substantial effects on urban transport, both on freight transport, on business transport, on shopping transport and on leisure transport. The complex impacts depend on a number of factors:

- Logistics model
- Location of distribution centres, delivery points, etc.
- Consignment sizes
- Market volume
- Bundling degree
- Vehicles used
- Substitution of former shopping trips
- etc.

The effects of e-commerce on urban transport are very complex and not well

understood. There is no general answer as every solution has to be assessed under its own framework conditions. Nevertheless many countries are pushing and promoting e-commerce activities - apparently without having thoroughly assessed its effects. On the other hand, cities and regions are still not aware of the chances and risks of e-commerce.

### 5.6.2 Recommendations

Challenging the  
urban municipalities

It might well be that e-commerce leads to an increase in urban freight transport that is not offset by an equal reduction in passenger transport. Such a rise in urban traffic would raise several problems for the concerned municipalities. These can be tackled by known economic and regulatory instruments such as vehicle and time restrictions, unloading spaces, environmental taxes, etc.. However, as e-commerce is only in its infancy a prospective approach must focus on preventive measures. From the public, i.e. ecological and town planning view some logistics solutions might be more attractive than others because they offer a higher potential for transport reduction and customer service. However, it is not known yet which ones. The municipalities have the instruments at hand (regulations, economic framework conditions, town planning) to support the development of the preferable ones. But as long as the main effects and relations are not well understood (see below) they should not interfere in market mechanisms.

Recommendations  
on city level

It is therefore recommended that the cities and regions monitor closely the development of e-commerce activities. Furthermore, they should participate in the suggested research activities on national and international level in order to identify chances and risks for urban areas due to e-commerce and to elaborate appropriate measures and framework conditions.

Knowledge gaps

The present study has drawn a sketch of the different logistics models of existing e-commerce solutions and their possible impact on urban transport. As many actors in this new business do not reveal their pioneer know-how the material collection has to stay incomplete. Several knowledge gaps can be identified:

- Different B2C e-commerce logistic solutions and their various effects on urban transport patterns
- How to make full use of the rationalisation potential within e-logistics
- The specific needs of B2C e-commerce logistics

Whereas for the last topic there is probably considerable know-how available among online-shopping companies (although not publicly available), there is particularly little knowledge about the first two which focus mainly on traffic

reduction, i.e. a topic of rather public interest. From the urban transport point of view it is especially the first topic that urges for further research.

Unclear impacts of e-commerce on urban transport

There are many different solutions to the logistic challenges of online-shopping concepts. Those solutions have different impacts on urban transport in general and particularly on the urban ecological system and the citizens' quality of life. Yet, no quantitative assessment of the impacts of different B2C solutions has been made so far. But if municipalities are to actively prevent undesired developments and anticipate future problems they need to know the pros and cons of the various solutions.

Recommendations on national and international level

Therefore, it is strongly recommended that further European and national research programmes investigate the following topics (in this order of priority):

- Analysis of the potential effects of e-commerce (particularly online-shopping) and its different logistic solutions on urban transport (freight, business, shopping, leisure). As the whole issue turned out very complex and heterogeneous it is recommended to focus on particular solutions (as "generic types") and assess their effects (preferably quantitatively).
- Identification of chances and risks for urban areas due to e-commerce activities
- Elaboration of appropriate measures and framework conditions in order to increase the positive effects and to minimise the negative ones (e.g. road pricing, land use planning, infrastructure planning, etc.)

Identifying and analysing positive and negative impacts of e-commerce on urban transport is especially urgent in view of many national initiatives promoting and supporting e-commerce activities. Forthcoming research activity on the E-economy and its transport consequences by the European Union (Task 2.1.2/9 within the Competitive and Sustainable Growth Programme, Key Action on Sustainable Mobility and Intermodality) might hopefully further treat the issue. However, as the topic is very complex and as national and local factors differ too, this will not be sufficient for a thorough assessment of the issue.



## 6 Road pricing and urban freight transport

### 6.1 Introduction

Why road pricing ?

Road pricing is increasingly discussed as one possible answer to the ever increasing transport volumes and the various problems they imply. It is not exactly a new topic, but being based on the “user pays principle” it fits well into the general recent trend towards market mechanisms (which could be observed particularly with ecological issues). Additionally, the fast evolution of telematic technologies is opening up new possibilities, triggering further road pricing activities.

BESTUFS  
Workshop in Genoa

Therefore, the sixth BESTUFS workshop, which took place in Genoa on the 8<sup>th</sup> and 9<sup>th</sup> of November 2001, was dedicated to the topic “City access fees and urban pricing: What are the consequences for urban freight transport ?”

Road pricing in the  
EU

Charges for road use and underlying cost calculations were already debated in the European Community in the early 60ties, but it was only in 1995 when the European Commission launched its Green Paper under the title “Towards Fair and Efficient Pricing in Transport: policy options for internalising the external costs of transport in the European Union”. [Rothengatter 1999] Therein the Commission advocates that: [FISCUS 2001]

- Pricing should be seen as a complement of regulatory and other market policies;
- The main aim of a fairer and more efficient pricing policy is to use price signals to curb congestion, accidents and pollution;
- Prices should reflect underlying scarcities to ensure sustainable transport;
- Appropriate infrastructure charging is needed to mobilise private capital and relieve the pressure on public budgets;
- The transport price structure should be: clear to transport users; differentiated across time, space and modes; non-discriminatory between modes and Member States.

The Green Paper was followed up by the White Paper on “Fair Payment for Infrastructure use: a phased approach to a common transport infrastructure charging framework in the EU”. Although not directly applicable to urban transport this paper reinforces that charging systems in the future should be based on the “user pays principle”. [FISCUS 2001]

The recent

In its recent White Paper on “European transport policy for 2010: time to

Transport Policy  
White Paper: Time  
to decide

decide” the Commission follows this path announcing a proposal for a framework directive 2002 which will “include a common methodology for setting price levels which incorporate external costs, and will specify the conditions for fair competition between modes”. [European Commission 2001] The white paper re-emphasises the role of charges in reducing congestion and pollution and in financing new infrastructure. [Howes 2001] Among other measures the Commission proposes to replace existing (flat) transport taxes with more efficient instruments for integrating infrastructure costs and external costs. [Major 2001]

### 6.1.1 Definition of road pricing

Güller et al. [2000] define *road pricing* as a generic term for different methods for charging fees for the use of roads. Methods depend on basic political decisions, e.g. the charge of fees on single vehicle types, congestion fees, entry fees, road- and bridge-tolls, etc.

Definition of road  
pricing for this Best  
Practice Handbook

Following this definition, we define *road pricing and urban freight transport* as all measures imposing direct fees for the use of (urban) roads that might be able to influence the urban freight transport system. This includes all road pricing measures on urban roads, whether they concern freight transport or passenger transport.<sup>2</sup> On the other hand the definition excludes all (so called “inter-urban”) road pricing on non-urban roads (e.g. motorway tolls, etc.) as well as other pricing measures such as fuel taxes, vehicle taxes or parking fees.

Restricted  
approach

An in depth analysis of pricing policies has to integrally consider the whole system of pricing measures applied to transport users of all modes in a certain area including fuel and vehicle taxes, (public) transport subsidies, transport related income tax deductions, road pricing, parking fees, etc. However, this would lead to an analysis of the whole fiscal system which cannot be done in the context of this Best Practice Handbook. Therefore, this Handbook only deals with road pricing schemes, being fully aware that they represent only one element of an entire pricing system.<sup>3</sup>

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<sup>2</sup> The pricing of passenger transport can influence the situation of urban freight distribution indirectly by reducing congestion (and thus improving the conditions for freight delivery in the area)

<sup>3</sup> For a comparative assessment of transport related taxation in various European countries, including vehicle taxation, fiscal treatment of commuting and business travel, corporate taxation, tax treatment of public transport, etc. see Oscar Faber 2000.

### 6.1.2 The economic idea of efficient pricing

The economic idea  
of efficient pricing

Efficient pricing refers to a price that fully reflects all individual and (long-term marginal) social costs, i.e. all external costs being internalised.<sup>4</sup> Economic theory states that under certain conditions the price mechanism will then match supply and demand (so called allocation process) at a level maximising social welfare. [Güller et al. 2000] On the other hand, prices too low (too high) lead to a socially sub-optimal excess-demand (demand deficit) and thus to an inefficient level of consumption.

One main advantage of pricing measures compared to regulatory and prohibitive measures is, that they adapt continually to the individual preferences of each user instead of only being binary (allowed / prohibited). [Maibach et al. 1993] Being more flexible, i.e. by allowing the use of a certain infrastructure to those whose individual benefit from the use is higher than the charged price and discourage the others whose individual benefit is rather low,<sup>5</sup> they increase the overall benefits of society. Another advantage of pricing measures is that they represent a continuous incentive whereas prohibitive measures only work up to the prohibitive limits. For example, with the prohibition of cars polluting more than a certain limit there is no incentive for improving car emissions below that limit whereas a road charge proportional to the car's emissions provides this incentive also below any threshold value.

Distorted transport  
prices

Transport prices (for all modes) are generally heavily distorted by taxes or direct and indirect subsidies. In many countries road transport is currently being subsidised in the sense that road users are provided with roads, space and complementary traffic services (e.g. parking space) whose costs they do not fully bear; in the early 1990s, in the US road users only paid for 20-50% of the costs of providing the roads and services they used; in Germany this figure was around 70%, whereas in the Netherlands and France road users paid around 10% above their proportional share. [De Moor et al. 1997] The gap between costs of road transport and the price for its use widens even more when external costs such as congestion, accidents, noise, air pollution and other emissions are taken into account. Furthermore, in most countries various cross subsidies exist: from passenger to freight transport, from rural to urban transport and from gasoline to diesel users. [De Moor et al. 1997] Urban transport by means of road-based modes is considered dramatically

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<sup>4</sup> Social marginal costs can be divided into the following components [Güller et al. 2000]:

- Private marginal costs: variable costs such as fuel, time, wear and tear of tires, etc.
- Variable infrastructure costs: wear and tear of road surface, road maintenance, etc.
- User costs: external congestion costs
- Costs outside of the transport system: external costs of noise, air pollution, accidents, climate change, etc.

<sup>5</sup> The individual willingness to pay is seen as an indicator for the individual preferences and benefits

under-charged. [Nash et al. 2001]

Objectives:  
financing, demand  
management and  
efficient allocation

Road pricing is based on market mechanisms and the polluter pays principle: the road user should pay for the costs he creates. Road pricing can be used as a measure for financing infrastructure (or other public expenditures). On the other hand, it is also seen as a measure to correct existing price distortions in the transport market (by “putting prices right”). The actual objective strongly influences the design of the pricing scheme as well as the use of its revenues. As the price level influences demand, road pricing measures aiming at allocative efficiency<sup>6</sup> are also referred to as demand management measures (as in the following too). Still, this use as synonyms (which is mainly due to the practically difficult notion of efficient allocation) should not conceal that the political objective of demand management is not necessarily identical with the economic objective of efficient allocation and its measures not necessarily in line with those of the latter.<sup>7</sup>

Difficulties and  
hindrances

The described theoretical principle of efficient pricing, also called marginal social cost pricing, is attractive and prominent. Still, it is not an undisputed panacea. Marginal social cost pricing is one pricing principle among others and (naturally) has its advantages and disadvantages,<sup>8</sup> theoretical as well as practical ones. For some interesting arguments against Marginal Social Cost Pricing see Prud'homme [2001].

Scientific  
disagreement

The implementation of the welfare-optimising theoretical rule “price equals social (marginal) costs” comes along with various problems. First, the valuation of social costs (particularly external costs) is difficult. Estimates differ considerably, reflecting a wide margin of uncertainty.

Practicability

Second, the exact charging of social marginal costs requires a highly sophisticated form of road pricing, e.g. differentiating by time, vehicle type, road sectors, etc. Such a system can cause high implementation and operation costs.

Political acceptance

Furthermore, it is not very transparent to road users and would cause acceptance problems. Today, no city dares to raise trip costs to a level that could substantially help to internalise external costs of road use. [PRIMA 2000] Data privacy is often considered a key problem; for instance, ensuring

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<sup>6</sup> There are different meanings of the term „efficiency“: whereas allocative efficiency refers to the most productive use of production factors according to the citizens' demand (or preferences), operational efficiency refers to producing a given output at minimal costs [Frey/Kirchgässner 1994]

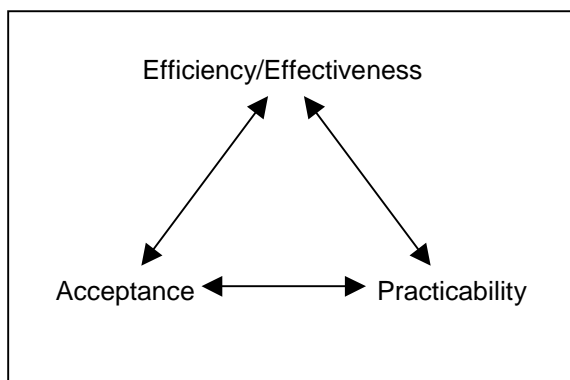
<sup>7</sup> Demand management will require high prices aimed at the users with a high elasticity, whereas efficient prices are determined by social marginal costs. Demand management may lead to efficient pricing, but it may as well increase prices beyond.

<sup>8</sup> For example, the revenues might not fully cover all infrastructure costs, as marginal cost pricing only considers variable costs, neglecting fixed costs (such as capital costs of infrastructure) [Maibach et al. 1999]

data privacy was one of the must-requirements for the planned Dutch road pricing scheme.

Theory and the real world

Real-world solutions therefore require simplifications while still trying to keep up the basic concept of a polluter pays pricing system as far as possible. [Güller et al. 2000] The assessment triangle for road pricing schemes in Figure 1 displays this field of tension.



**Figure 44: The assessment triangle [PRIMA 2000]**

### 6.1.3 Different categories of road pricing

Road pricing typology

There is no such thing as one optimal road pricing scheme. The choice of the most suited road pricing scheme depends on the objectives of road pricing, the existing traffic problems, the geography of the urban area as well as the history of transport policies. [PRIMA 2000] Accordingly, there is a large variety of different road pricing schemes which can be categorised according to a large number of different criteria. In the PRIMA project the following 5 forms of (urban) road pricing schemes have been identified: [PRIMA 2000]

Single road pricing

Charges on single roads or single lanes are generally collected at passage (entry or exit). Single road pricing is common for financing new roads. The assessment of this form of road pricing depends on the availability of alternative routes. If the priced roads are arterial roads, single road pricing might be efficient and effective, as several examples in Europe show. But there is a danger of car users diverting to other routes causing additional congestion and pollution there. A special kind of single road pricing are the so called pay-lanes (charged lanes parallel to lanes free of charge).

Network pricing

Charging the motorway network in, around or to a city (or between cities) is a common form of road pricing. In the urban context it is often limited to the network outside the city or to major roads leading to the city. Practicability

	<p>and acceptance may be on a high level, but in that scheme also, efficiency and effectiveness are limited by undesired diverting of traffic to other routes.</p>
Area pricing	<p>Area pricing does not have the drawback of cars switching to alternative routes, as every transport in the priced area(s) is charged. From the point of view of effectiveness and efficiency a multi-zone pricing is even better. However, the practicability of a multi-zone pricing based on electronic fee collection is not yet given.</p>
Cordon pricing	<p>In this case charges are collected on entry and / or exits around a whole area (e.g. inner city). Contrary to area licensing trips starting and ending within the area are not priced. There must be some kind of “natural” position for the cordon in order to prevent major price distortions between locations inside and outside the cordon.</p>
Complex area pricing	<p>Complex area pricing denotes a distance based area pricing scheme with charges ideally set equal to social marginal costs. Charges should vary according to distance, daytime (peak, off-peak), congestion, vehicle categories, etc. Such a high degree of differentiation can only be realised with electronic fee collection techniques. Today, complex area pricing is not a scheme to start with, as major pre-conditions (acceptance, inter-city or international standardisation of electronic collecting techniques, etc.) are not fulfilled. Within a step-by-step approach however the long-term goal may still be to introduce a complex area pricing.</p>
Other differentiating criteria	<p>Other criteria to differentiate between various forms of road pricing schemes include:</p> <ul style="list-style-type: none"><li>• use of revenue: municipality budget, reducing taxes and other charges, earmarking for environment friendly projects, public transport, road or rail infrastructure, etc.</li><li>• pricing structure: time, vehicle type (according to emissions, noise, etc.), traffic conditions (congestion level, etc.), etc.</li><li>• price level / targeted cost level: infrastructure costs, maintenance costs, external costs, etc.</li><li>• main objectives of the pricing scheme / targeted transport patterns: choice of route, time of trip, length of trip, trip frequency, modal split, choice of vehicle, choice of location, etc.</li><li>• affecting passenger transport or freight transport or both ?</li></ul>

## 6.2 Related research activities

Extensive research activity on road pricing has been done or is still ongoing. However, none of the known projects is focussing on the aspects of urban freight in relation to road pricing in particular. The following European<sup>9</sup> and national research projects related to road pricing and urban freight transport have been identified: [CAPRI 2001, CUPID 2000, CORDIS 2002, BESTUFS 2001a]

European research projects:

4<sup>th</sup> Framework Program (1994 - 1998)<sup>10</sup>

**AFFORD** (Acceptability of Fiscal and Financial Measures and Organizational Requirements for Demand Management) aims to identify practical measures to implement marginal cost pricing in urban areas both in the short and long term. The project examines the institutional, economic (including equity) and public and political acceptability issues affecting the implementation of these measures and ways to overcome any identified constraint or problem. It involves six case studies - Athens, Dresden, Edinburgh, Helsinki, Oslo and Madrid. Project website: [www.vatt.fi/afford](http://www.vatt.fi/afford)

**CAPRI** (Concerted Action on Transport Pricing Research Integration) was commissioned to facilitate the exchange of information and results from research projects dealing with the pricing of transport. Key objectives were: to aid dissemination of research results, to present a synthesis of research findings, to facilitate discussion, to attempt to build up a consensus on the policy implications of this research.

Project website: [www.its.leeds.ac.uk/projects/capri/index.html](http://www.its.leeds.ac.uk/projects/capri/index.html)

**CONCERT-P** (Co-operation for novel City Electronic Regulating Tools) aimed at producing guidelines for the development and implementation of European and local policies on pricing and access restriction, based on the assessment of the efficiency and acceptability of related transport demand management measures (integrated pricing and restraint measures, time-dependant and vehicle-based tolling, pollution-based pricing etc.). Their impact on urban traveller behaviour and travel demand patterns was modelled and evaluated through partial demonstrations in Bologna, Hanover, Marseilles, Dublin, Thessaloniki, Barcelona, Trondheim and Bristol.

**EUROTOLL** (European Project for Toll Effects and Pricing strategies) sought to validate the effectiveness of pricing measures in 13 cases in France, Italy, Austria, Germany, Great Britain, Greece and Portugal. The project centres on using road pricing as a congestion management tool. Final summary available at [www.cordis.lu/transport/src/eurotollrep.htm](http://www.cordis.lu/transport/src/eurotollrep.htm)

**FISCUS** (Cost Evaluation and financing Schemes for Urban Transport systems) sought to evaluate total transport costs (internal and external) in

<sup>9</sup> Additional information on the EU transport research programme is available at the programme's knowledge centre: <http://europa.eu.int/comm/transport/extra/home.html>

<sup>10</sup> The 4<sup>th</sup> Framework Programme officially ended in 1998, but some of the projects lasted longer.

view of comparing costs between public transport and private car use. The research also looked at cost allocation practices in urban areas with a view to identifying feasible and effective means to finance urban transport systems. Final report available at:

<ftp://ftp.cordis.lu/pub/transport/docs/summaries/fiscusrep.pdf>

**PATS** (Pricing Acceptability in Transport systems) defines a priori measures to increase the acceptability of marginal cost based pricing in transport based on an analysis of the reactions and comments to the Green and White Papers on pricing. These measures are tested and enhanced empirically using citizen surveys in six countries and focus group discussions in four countries. The implications of the suggested measures are assessed using modelling techniques.

Project website: [www.tis.pt/proj/pats/ukpatstitle.htm](http://www.tis.pt/proj/pats/ukpatstitle.htm)

**PETS** (Pricing European Transport systems) gives practical advice on what the consequences of implementing efficient prices will be in terms of volume of traffic, choice of mode and environmental consequences. The pricing scenarios tested included: (i) marginal cost pricing; (ii) marginal cost pricing subject to a budget constraint; and, (iii) full internal and external cost recovery. The project also examines the relationship between deregulation and pricing. It involves five case studies - Channel crossing, crossing of the Alps, Oslo-Gothenburg, Finland, and the Tagus River crossing in Lisbon.

**PRIMA** (Pricing Measures Acceptance) studies the acceptance issue for road pricing schemes that have been implemented or where non-acceptance has resulted in rejecting the scheme. The project also looks at technological specifications and design issues.

Project website: [www.certu.fr/internat/peuro/prima/prima.htm](http://www.certu.fr/internat/peuro/prima/prima.htm)

**TRANSPRICE** (Transmodal Integrated Urban Transport Pricing for Optimum Modal Split) addresses a wide range of transport demand management measures (ringtolling, area pricing, parking pricing combined with access restrictions etc.) with an additional emphasis on how pricing may be integrated across a number of transport modes and related facilities. The indicators of success are primarily the efficiency (in terms of how it affects mobility demand and traffic congestion) and public acceptance. Participating cities were: Athens (Greece), Como (Italy), Gothenborg (Sweden), Graz (Austria), Helsinki (Finland), Leeds (United Kingdom), Madrid (Spain) and York (United Kingdom). Project website: <http://gridlock.york.ac.uk/transprice/>

**TRENEN II STRAN** (Models for Transport, Environment and Energy, version 2; Strategic Transport Policy analysis) analysed different combinations of pricing and regulatory instruments in order to identify optimal combinations to solve environmental, energy and pure transportation problems. It involved six urban case studies - Amsterdam, Athens, Brussels, Dublin, London and Mestre - and three regional case studies - Belgium, Ireland and Italy. The TRENEN model maximises a weighted sum of the consumer and producer surpluses, tax revenues and external effects by selecting a set of policies under constraints.



European research projects:

5<sup>th</sup> Framework Program (1998 - 2002)<sup>11</sup>

**CUPID** (Co-ordinating Urban Pricing Integrated Demonstrations) is a Thematic Network funded by DG TREN of the European Commission which aims to promote state of the art knowledge on urban transport pricing schemes. Its other important role is to provide guidance and assistance to the eight European cities developing and demonstrating congestion charging as part of the PROGRESS project (see below).

Project website: [www.transport-pricing.net](http://www.transport-pricing.net)

**DESIRE** (Designs for Interurban Road Pricing Schemes in Europe) is developing a set of basic designs for interurban road pricing systems for heavy goods vehicles, is carrying out an in depth analysis of the impacts of such systems and is developing a set of guidelines for the design, financing and implementation of such systems. The situations in 13 European countries and Brazil are studied. Project website: [www.tis.pt/proj/desire.htm](http://www.tis.pt/proj/desire.htm)

**IMPRINT** (Implementing Pricing Reform in Transport - Effective Use of Research of Pricing in Europe) is a thematic network project. It aims at bringing together all different stakeholders in order to promote the implementation of fair and efficient transport prices. It will organise 5 international seminars on the topic, summarise research and give recommendations. Project website: [www.imprint-eu.org](http://www.imprint-eu.org)

**MC-ICAM** (Marginal Cost Pricing in Transport - Integrated and Conceptual Applied Model Analysis) examines policy reforms in the pricing of transport, in particular optimal transition paths from a situation with low pricing of transportation towards marginal social cost pricing. Work includes theoretical analysis as well as the examination of selected geographical areas. With regards to urban issues studies in the Randstad (NL), in Paris, Oslo, Brussels and Helsinki are planned. Project website: [www.mccam.net](http://www.mccam.net)

**PROGRESS** (Pricing Road Use for greater Responsibility, Efficiency and Sustainability in Cities) includes research and demonstration project in 8 European cities, namely Bristol, Copenhagen, Edinburgh, Genoa, Rome, Helsinki, Trondheim and Gothenburg. Project website: [www.progress-project.org](http://www.progress-project.org)

**UNITE** (Unification of accounts and marginal costs for Transport Efficiency) is designed to develop methodologies and empirical evidence to support decision-makers involved in developing pricing and taxation policies for all significant passenger and freight modes - road, rail, air, inland waterway and maritime - in Europe. UNITE will produce social transport accounts for 18 European countries.

Project website: <http://www.its.leeds.ac.uk/projects/unite/>

Other European projects

**EUROPRICE** (European Urban Road Pricing Network) is a network of European cities for mutual political support, exchanging experiences and providing a focus for city/regional issues in the road pricing debate. The

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<sup>11</sup> The 5<sup>th</sup> Framework Programme is officially ending in 2002, but some of the projects are still ongoing (e.g. BESTUFS)

network was set up 1999 by the Bristol City Council and is supported by the European Commission (DG TREN). Participating cities are/were: Bristol, Belfast, Copenhagen, Edinburgh, Genoa, Leicester, Rome, Trondheim. Project website: [www.europrice-network.org](http://www.europrice-network.org)

National general  
road pricing  
research projects

**NFP 41** (Switzerland, 1995 - 2001) is a comprehensive National Research Programme on Transport and Environment aiming at an efficient, environment-friendly, socially acceptable transport policy. It consists of over 50 research projects, among which the reports D3, D11, E2 and M20 deal with road pricing issues. D3 (Fair and efficient prices for transport) treats different approaches for a national transport policy according to the polluter pay principle. D11 (Road pricing in Switzerland) investigates the acceptance and feasibility of possible road pricing approaches in the light of public opinion polls and international experiences. E2 assesses the interoperability of electronic fee collection systems, particularly opportunities and limits of additional applications of the implemented Heavy Goods Vehicles fee collection system (LSVA<sup>12</sup>).<sup>13</sup> M20 analyses technical and operational possibilities for fee collection on roads.<sup>14</sup> Project website: [www.nfp41.ch](http://www.nfp41.ch)

Currently, a **ministerial commission** is investigating the possibilities of road pricing in Denmark.

**CERTU** (France), le Centre d'Etudes sur les Reseaux, les Transports, l'Urbanisme et les Constructions Publiques, is doing a lot of research on road pricing issues. Their latest publication (in French) is titled "Urban Road Pricing: The issue of Acceptability". CERTU website on pricing: <http://www.certu.fr/transport/tarification.htm> (in French)

**Kilometerheffing** (Netherlands) is a major project of the Dutch Ministry of Transport, in which currently the kilometre based road pricing system for all domestic motorvehicles and all heavy goods vehicles (>12 tons GVW) is being developed. The results of the research and development activities regarding kilometerheffing are made available at the project website [www.roadpricing.nl](http://www.roadpricing.nl) (in English) and [www.projectkilometerheffing.nl](http://www.projectkilometerheffing.nl) (in Dutch)

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<sup>12</sup> see Annex II, project CH - 01

<sup>13</sup> a summary of the report is given in Annex II, project CH - 02

<sup>14</sup> a summary of the report is given in Annex II, project CH - 03

### 6.3 Situation at country level

Fast changing information

Material regarding the situation of road pricing in general and of projects related to road pricing and urban freight in different European countries was collected by the various BESTUFS contractors and members. Further input came from the involved experts and the workshop. The following chapters summarise the main findings of the material collection on country and project level. The given information and its assessment represent the situation at the time of collecting the material, i.e. beginning of 2002.

14 countries represented

Material on 14 countries has been collected, covering the whole European Union except Portugal, Ireland and Luxembourg, plus Switzerland and Norway (see Figure 121).

A detailed report on each country's situation concerning road pricing and urban freight transport is given in Annex I.



Figure 45: Countries covered by the material collection

### 6.3.1 Importance of road pricing

In order to give a brief impression of the relevance of the topic the BESTUFS partners participating in the material collection were asked to estimate the importance of road pricing in their country. Although the term “importance” is defined rather vaguely and its estimation is always subject to the personal view of the assessor, a rough overview on their different estimations sketches a first picture of the European road pricing situation of today and possibly tomorrow.<sup>15</sup>

Still rather little  
importance of road  
pricing today ...

In a majority of Europe’s countries the general concept of road pricing (in all its different forms, urban or inter-urban) is estimated to be of rather little importance (see Figure 46). In those few countries where road pricing is considered more important, it is mostly used for (financing) inter-urban motorways (Eurovignette, motorway tolls). Exceptions are the Swiss Heavy Vehicle Fee and the several urban pricing schemes in Norway.

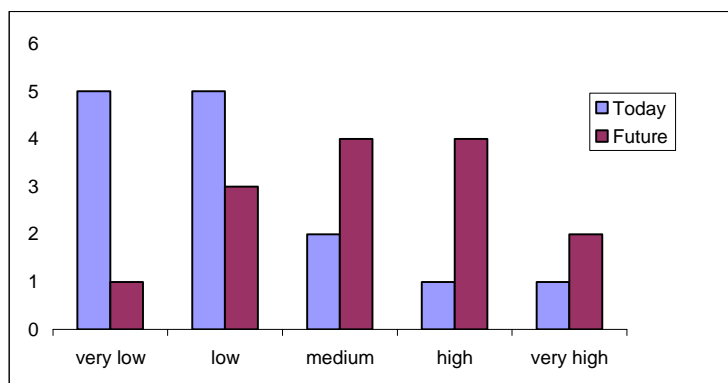
When it comes to urban freight transport in particular the importance of road pricing today is estimated even lower (see Figure 47). The explanation for this is twofold. First, with the exception of Norway and a few single road pricing schemes there are hardly any *urban* road pricing schemes implemented so far. Second, the existing urban road pricing schemes mostly focus on passenger transport and on financing rather than demand management. They are therefore perceived as less important for freight transport - although they do have an impact on freight transport too.

... but expected to  
increase heavily in  
the future

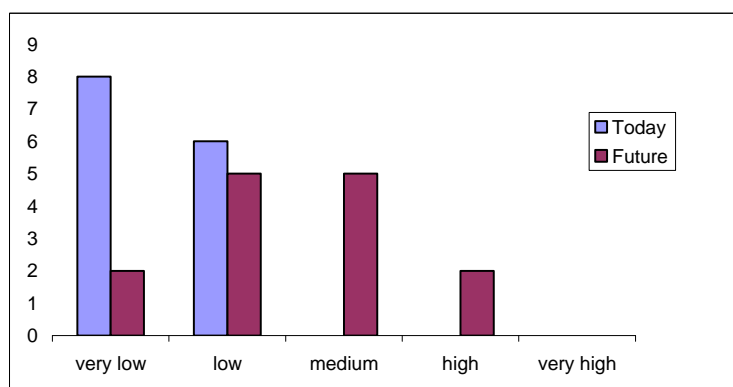
However, this rather modest picture only applies for today. When it comes to the future, there is a widespread consensus that road pricing will substantially gain importance, both in general and for urban freight transport in particular (see Figure 46 and Figure 47). Although other parts of the transport system will probably be even more affected by future road pricing projects than urban freight transport, road pricing is well relevant for BESTUFS too, as it is a progressive, future-oriented topic that should be observed prospectively.

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<sup>15</sup> Please note that the considerations expressed in this chapter represent the personal opinions of the BESTUFS partners participating in the material collection and should not be mistaken as a statistical opinion poll.



**Figure 46: Today's and future importance of road pricing in general <sup>16</sup> (number of countries)**



**Figure 47: Today's and future importance of road pricing for urban freight transport <sup>17</sup> (number of countries)**

### 6.3.2 National road pricing situations

Common inter-urban motor-way tolling

A summarising overview on existing and planned road pricing schemes within Europe (see Annex II) confirms the picture drawn in the preceding chapter. Quite a number of single roads (mostly non-urban) are charged, usually using toll booths. Charging motorway users is common in various southern countries as well as in France. [Maibach et al. 1999] For many motorway networks there are time based schemes, e.g. the "Eurovignette"

<sup>16</sup> according to the personal estimations of the BESTUFS members participating in the material collection

<sup>17</sup> according to the personal estimations of the BESTUFS members participating in the material collection

for Heavy Goods Vehicles or the Swiss Motorway-Vignette. Germany and Austria are currently discussing new charges for Heavy Goods Vehicles on motorways (so called "LKW-Maut").

Urban road pricing  
still in its infancy ...

But when it comes to urban road pricing or to road pricing for demand management, road pricing is still in its infancy (see Figure 48). Norway is probably the leading European country in urban road pricing. The several Norwegian cordon pricing schemes (Oslo, Trondheim, etc) are the only operating urban road pricing systems, apart from a number of charged urban single roads, e.g. in France (Marseille, Lyon, etc.). They all have been set up to raise money for infrastructure development. In Switzerland, the distant related Heavy (Goods) Vehicle Fee (LSVA) is aiming at demand management. Since 2001 it is charged on all public roads including urban areas.

... but many  
initiatives in the  
pipeline

Although the implemented urban road pricing schemes are very few, there are a large number of ongoing initiatives and planned projects proving the increasing importance of the issue. In Norway there are proposals to allow additional charging for demand management. In Belgium there are plans for a cordon pricing scheme for the Brussels region after 2005. The Netherlands have abandoned the formerly planned cordon-pricing scheme for the Randstad region in exchange for the now planned nation-wide distance-related road pricing for all vehicles (Kilometerheffing) to be introduced from 2004 till 2006. In the United Kingdom, the Mayor of London's current Transport Strategy proposes a time based road pricing for demand management in central London. Furthermore a distance based fee for lorries on all UK roads is planned to be introduced in 2005 or 2006. Other ongoing initiatives include various demonstrators and field trials within national and European research projects, e.g. PROGRESS.

... although not  
everywhere

Not all countries do jump the European road pricing train. Urban road pricing, in particular for demand management, is a rather low profile issue in Finland, Austria, Germany, France and Greece. In Spain, the subject has been completely abandoned. It is considered completely at odds with the Spanish mentality. [Montero 2001]

In the following we give a very brief summary on the national situation in the various countries (summarised in Figure 48).<sup>18</sup>

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<sup>18</sup> A more detailed report on each country's situation concerning road pricing and urban freight transport is given in Annex I.



**Figure 48: Urban road pricing development in Europe<sup>19</sup>**

Norway: the most experienced

In Norway, several road pricing schemes are operational, from single road pricing approaches to network pricing as well as cordon pricing such as the toll rings around Oslo, Trondheim and Bergen. These toll rings solely aim at financing transport infrastructure, but there are plans to extend the concepts in order to manage demand.

Sweden: highly debated

After the introduction of a cordon-pricing scheme for Stockholm failed, there are currently no schemes or precise proposals existing. However, road pricing has been high on the Swedish agenda for the last ten years and Gothenburg has been carrying out a number of field trials within the PROGRESS project.

Finland: no big issue

Road pricing is presently not a big issue in Finland. Although Helsinki is currently taking part in the PROGRESS project, there are few indications that any real proposal is likely to come forward in the near future.

Denmark:

Fees are collected for the two large bridges Great Belt and Oresund, and

<sup>19</sup> The intensity of grey gives a very rough and generalised estimate of the level of evolution [white=not assessed; level 1=no experience; level 2=some field trials; level 3=not specifically urban, but complex pricing; level 4=about to be implemented; level 5=urban road pricing implemented]

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ministerial commission investigating	Copenhagen is doing a field trial within PROGRESS. For the next two years, a ministerial commission is investigating the possibilities for road pricing in Denmark. However, with the change in the government the political climate is less likely to be in favour of road pricing in the coming years.
United Kingdom: nothing implemented yet, but many ambitious projects	There are currently very few examples of road pricing in Great Britain with tolls for inter-urban roads and bridges the only worthy of mention. However, road pricing is a high profile issue, especially in London, where a fee for accessing the city centre is planned for 2003. But also other cities are investigating the possibilities of road pricing. In order to share ideas and develop pioneering schemes the Government set up a Charging Development Partnership including Leeds, Derbyshire, Bristol, Edinburgh, Greater Manchester, Hampshire and London. Furthermore, the government plans to introduce a lorry road-user charge on all UK roads in 2005 or 2006 which will replace existing vehicle excise duties and enables charging according to distance and route travelled.
France: a disappearing topic	While motorway tolling is quite common in France, urban road pricing has been a very controversial issue between the mid nineties and 1999 when a few experiments were proposed or implemented. A "national network of local associations anti urban road pricing" was created. Today, the issue has nearly disappeared from local government's agendas, with the exception of the urban areas of Lyon, Grenoble and Saint Etienne.
Belgium: Brussels' plans for 2005	In Belgium, the only experiences with road pricing are the Eurovignette for HGV and a tolled motorway tunnel. But modifying the motorists' global taxation is a prominent topic in Belgium. In the media, two broadcasts at peak listening times were devoted to road pricing and there are plans for a cordon pricing scheme for the Brussels region in 2005.
The Netherlands: ambitious national plans	The awareness of road pricing among the different stakeholders is high in the Netherlands. The topic has been treated by the Ministry of Transport for the last ten years and is regularly addressed in the media. Former plans for a peak hour vignette (Spitsvignet) and a cordon pricing scheme around the four major cities Amsterdam, Rotterdam, The Hague and Utrecht (Spitstarief) have been abandoned. Now it is planned to introduce a nation-wide distant related road pricing for all vehicles on all roads, starting in 2004. On a later stage the tariffs might be differentiated by time and place.
Switzerland: demand management by LSVA	Switzerland has introduced the distance, weight and emission related Heavy Vehicles Fee (LSVA) on all public (including urban) roads in 2001, mainly for demand management. But on city level there are no road pricing measures discussed, apart from vague plans for single roads. Urban road pricing sporadically appears in the media, but it is not on the political agenda.
Germany: distance related Heavy Vehicle Fee planned for 2003	The present discussion on road pricing in Germany is mainly related to the financing and to the cost coverage of infrastructure in inter-urban transport. The existing Eurovignette for HGV on motorways is planned to be replaced by a distant and emission related road pricing scheme for HGV in 2003. On city level there are no plans to introduce any road pricing measures.



Austria: focussing on inter-urban pricing

Due to the above average traffic development in Austria road pricing became a very sensitive political topic within the last decade. Awareness is very high, as people are convinced that traffic policy will have an essential impact on the economic and social development of the country. However, the Austrian discussion always focussed on motorways. There has never been a public discussion on road pricing for urban transport. Several sections of the motorway network are being tolled, an electronic system for the whole network is planned for 2004.

Italy: ongoing investigations and pilots

In Italy, pricing of parts of the motorways is quite common. On an urban level, specific road pricing schemes are being investigated and tested in the cities of Rome and Genoa (within the PROGRESS project) in order to reduce traffic and to protect the environment of the historical areas.

Greece: high awareness, low acceptance

On an inter-urban level road pricing is a rather widespread practice in Greece in order to finance roads and their maintenance and operation. Transport professionals (and to a lesser extent administrations and politicians too) are highly aware of road pricing techniques. Nevertheless, the implementation of urban road pricing (particularly for demand management) is still considered highly improbable due to the expected low acceptance by the public (new fee, data privacy, etc).

Spain: no gracias!

Although motorway tolling exists in Spain, the subject of other road pricing has been completely abandoned. No city is thinking about the implementation of a road pricing system, as these kind of measures are completely at odds with the Spanish mentality. People do not even pay the parking meter, the municipal authorities not being able to enforce it.

### 6.3.3 Legal framework conditions

European  
background

The Commission of the European Community plans to propose a framework directive in 2002 to establish the principles of infrastructure charging and a pricing structure for all modes of transport. The proposal will include a common methodology for setting price levels which incorporate external costs, and will specify the conditions for fair competition between modes. Additional revenues from external cost pricing are to be channelled into specific national or regional funds in order to finance measures to lessen or offset external costs (double dividend). [European Commission 2001]

Furthermore, road pricing for Heavy Goods Vehicles (HGV) over 12 tons is currently not legally possible in the EU Member-states on other roads than motorways, bridges, tunnels and mountain passes. This is described in the so called "Eurovignette directive" (1999/62/EC) which only allows an exemption from this rule for the specific goal of fighting congestion at certain places. However, the EC has announced an alternative directive for 2002.<sup>20</sup> [Howes 2001]

National legislation:  
only three countries  
allow urban road  
pricing

Whereas quite a number of countries allow inter-urban road pricing for motorways or for Heavy Goods Vehicles,<sup>21</sup> currently only three out of the 14 examined countries do have national, regional and communal legislation that allows the introduction of urban road pricing schemes: Norway, the UK and Italy (Figure 49).

Norway

According to the law (Vegloven) road pricing can be introduced in Norwegian cities if the local authority wishes to. The final decision has to be taken by Parliament.<sup>22</sup>

United Kingdom

The Labour government has facilitated the introduction of road user charging through the Greater London Act and The Transport Act 2000 by giving powers to the London Mayor and to local authorities outside London to introduce charging schemes. The Bill also provides for the revenues raised to be ring-fenced and to be used specifically for local transport improvements.

Italy

National legislation already exists in Italy to support road pricing initiatives, namely

- Road code which authorises road pricing when used to protect historical

<sup>20</sup> In the course of the White Paper 2001 also a directive on rail charges (2001/14) has been set up with respect to fair competition between road and rail transport. [Howes 2001]

<sup>21</sup> Although e.g. France restricts the levied fees to the level of infrastructure costs, making it impossible to consider external costs

<sup>22</sup> The existing toll rings around many cities are not considered as road pricing and subject to a different law

centres

- “Decreto Bassanini” that authorises the remote issuance of tickets for non-compliance with restricted areas (i.e. the possibility to use ITS technologies for enforcing these areas).

The others

Sweden has drawn up a proposal which has yet to be passed into law.

In many countries the legal prerequisites for urban road pricing are not given (yet): Finland, Denmark, The Netherlands, Austria, Switzerland, Germany, Greece. In France and Belgium the legal situation is unclear.

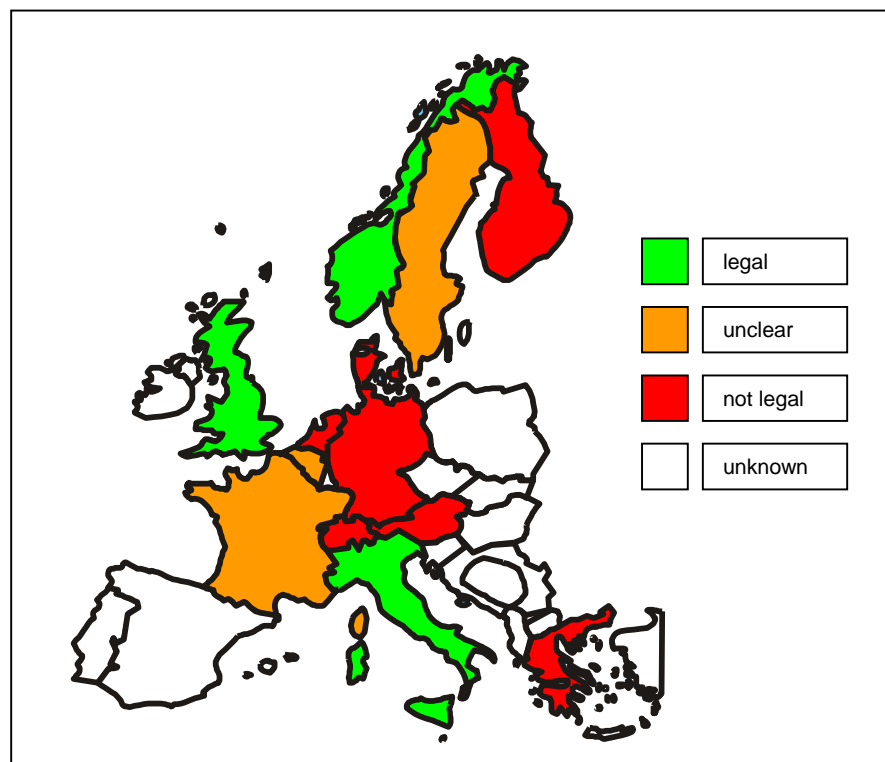


Figure 49: Legal situation on urban road pricing in Europe

#### 6.3.4 Attitude of goods transport professionals

Professional transport providers all over Europe are obviously not enthusiastic about road pricing initiatives, mainly because they fear that it will impose new costs on their business. Naturally, the private interests of road

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	<p>transport operators are not necessarily congruent with public welfare. However, the national barometers of opinion are far from uniform.<sup>23</sup></p>
From complete rejection...	<p>In general, freight transport business in Spain, Belgium, Switzerland and Sweden is against road pricing. Reluctance might decrease according to the use of revenues and the balancing of road charges by a reduction in existing taxes.</p>
... and acceptance under certain conditions ...	<p>In other countries, professional transport operators are not a priori against road pricing - if certain conditions are met. Norwegian transport operators are generally against, but many are in favour too, provided that there are significant improvements for road users (e.g. through financing of road infrastructure). Also Austrian road hauliers are not generally opposed as long as the solution is not discriminating single actors and harmonised with other EU-countries.</p>
... to the expectation of benefits	<p>In some countries, the transport operators do even recognise a certain benefit from road pricing. In Denmark, it is perceived as more fair in regard of time and place of the road usage than flat taxes, but only acceptable if tax pressure neutral and not discriminating certain modes of transport. In Germany, the planned distant related Heavy Vehicle Fee is accepted as it makes foreign transport operators participate on German infrastructure costs and thus harmonises competition. In the UK, the Freight Transport Association FTA is very pro road user charging to promote foreign operators paying on an even playing field. When it comes to urban road pricing, French transport operators are not too opposed (as long as not charged too heavily), because road pricing might lead to less private cars, reduce city congestion and thus improve their efficiency (higher average speed).<sup>24</sup> Due to their higher time value (compared to e.g. a private leisure trip) transport business could therefore gain a net benefit from road pricing. In the Netherlands, <u>all</u> stakeholders (!) including the transport operators do generally agree with road pricing and the polluter pays principle - for the same reason. Still, the question remains, whether road pricing will really reduce congestion - and at what price?</p>
No general pattern identified	<p>As the experiences with road pricing (particularly for demand management) are very few, no conclusions can be drawn on this level about the experiences made with road pricing and its acceptance by transport operators. Furthermore, acceptance is a very complex and manifold issue.<sup>25</sup> For further considerations and a discussion of the most popular arguments with regard to urban road pricing and its consequences for freight transport</p>

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<sup>23</sup> The following description of national political opinions are based on the personal estimation of various transport experts and not on statistical surveys or opinion polls.

<sup>24</sup> Note that this kind of argumentation might be inconsistent because a noticeable reduction of congestion is probably only achievable by a sufficiently high level of charges (due to the low price elasticity of private transport demand)

<sup>25</sup> see PRIMA 2000, which however does not distinguish freight transport operators

please refer to chapter 6.6.

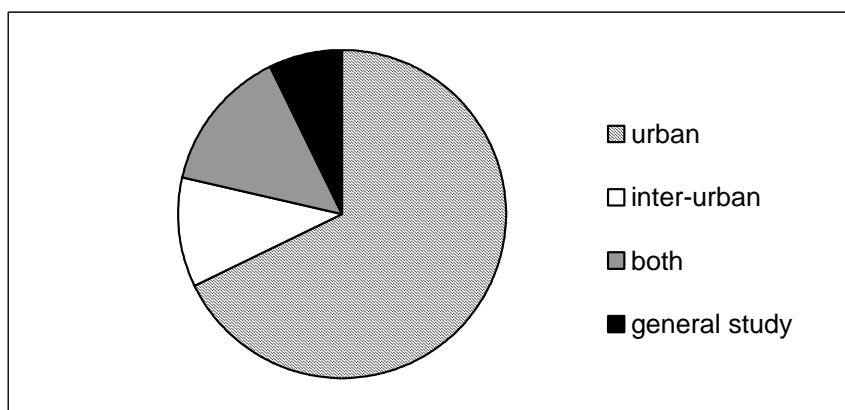
#### 6.4 Regarded case studies (project-level)

28 projects collected

28 projects from all participating countries except Spain have been collected. Annex III gives an overview on all collected projects, the project's phase, its extension, the applied pricing scheme, the pursued objectives, the type of transport charged and the chosen technical approach.

Focus on urban road pricing

A large majority of the collected projects are directly or indirectly related to urban road pricing (see Figure 50).



**Figure 50: Collected projects according to their extension**

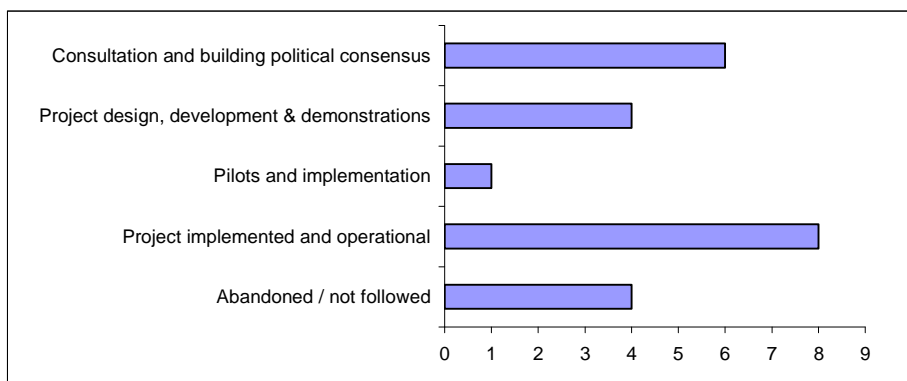
Although also inter-urban road pricing schemes might have an effect on urban freight transport in terms of technical development, overall awareness about road pricing, route planning, etc., urban road pricing schemes (including those affecting urban as well as non-urban roads) are more likely to be relevant for urban freight. Therefore the following assessment of case studies is focussing on exclusively or inclusively urban road pricing schemes.

One third operational, mainly for revenue generation

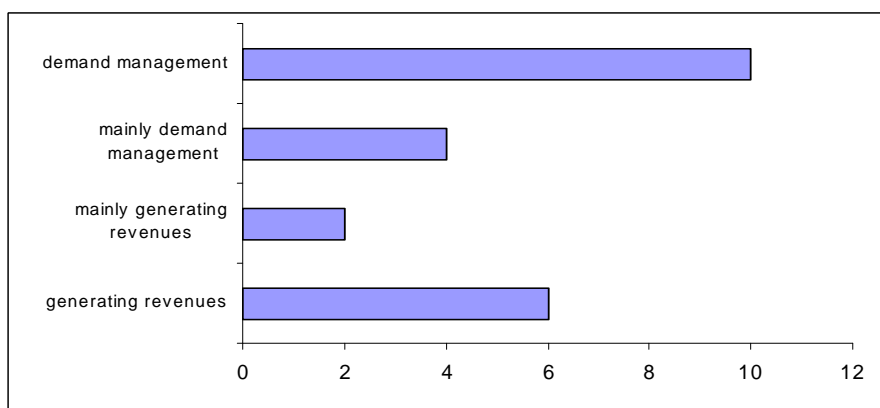
About one third of the collected (urban) road pricing projects are currently implemented and operational. One sixth have been abandoned. The rest has not yet overcome the consultation and design status (see Figure 51).

A majority of the projects have (mainly or exclusively) been set up for demand management (see Figure 52). However, with the exception of Rome's automatic access control system and the Swiss Heavy Vehicle Fee,

all implemented schemes are (mainly or exclusively) for revenue generation. Thereby most revenues are earmarked for road infrastructure. This strong correlation between road pricing objectives and project status is a clear picture of the fact that road pricing for demand management is mostly not accepted yet.



**Figure 51: Collected (urban) projects according to their status**



**Figure 52: Collected (urban) projects according to their objective(s)**

8 projects from other EU research projects

9 out of the total of 28 projects (i.e. circa 30%<sup>26</sup>) are part of other research projects funded by the European Union. The Athens field trial (GR - 01) and the study on Graz (AT - 05) have been done within the TRANSPRICE project (see Chapter 9.2). The projects in Copenhagen (DK - 02), Helsinki, Trondheim, Gothenburg, Rome and Genoa are part of the currently running PROGRESS project, which is also part of the 5<sup>th</sup> Framework programme just as BESTUFS. The second Danish project (DK - 01), also in Copenhagen, was part of the EU-funded EUROPRICE network project.

The relatively high number of EU research projects highlights the importance

<sup>26</sup> If we consider only the projects pricing urban roads it is even 40%.

of European research for road pricing and the high relevance the European Commission attributes to the subject.

The web-sites of EUROPRICE,<sup>27</sup> TRANSPRICE<sup>28</sup> and PROGRESS<sup>29</sup> and the respective deliverables provide extensive information and analysis on the mentioned projects. Therefore, the corresponding projects have not been considered in the first place in the following detailed project descriptions.

Additional world-wide projects

The present BESTUFS material collection on road pricing and urban freight transport tries to cover the most important projects on the theme within Europe. However, as the material collection is limited to European countries we would like to give a short link to the following additional projects, initiatives and studies on urban road pricing that have been identified: [CERTU 2001]

- Auckland (Canada): Study on the impact of a cordon pricing scheme [www.ucalgary.ca/~jabraham/Papers/ModellingPricingInAuckland/odyframe.htm]
- Hong-Kong (China): First series of tests in 1983-1985. Other tests based on GPS in 1998-1999. So far, no political decision has been taken yet. A feasibility study did assess DSRC and VPS technology [www.info.gov.hk/td/eng/publication/images/erp.pdf]
- Singapore (Singapore): Has established a cordon pricing scheme around the trade centre already in 1975. Since 1998 there is a fully electronic congestion charging scheme operating [www.gov.sg/Ita/MenuFrame2.htm]
- Tokyo (Japan): In 2000 (?), the Governor of Tokyo proposed a cordon pricing scheme for the Tokyo city centre for traffic regulation
- Kamakura (Japan): A cordon pricing scheme has been proposed by the people in 1995 in order to protect the historic city centre

Assessment of the projects

The following project descriptions show examples of planned or implemented road pricing projects and assess the experiences made. As many innovative projects are planned or set-up a selection had to be made.

Thereby, the following aspects were considered:

- Relevance for BESTUFS, innovative character and contribution to solve problems
- Success / failure analysis and real world experiences
- Balance among countries and approaches

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<sup>27</sup> www.europrice-network.org

<sup>28</sup> http://gridlock.york.ac.uk/transprice/

<sup>29</sup> www.progress-project.org

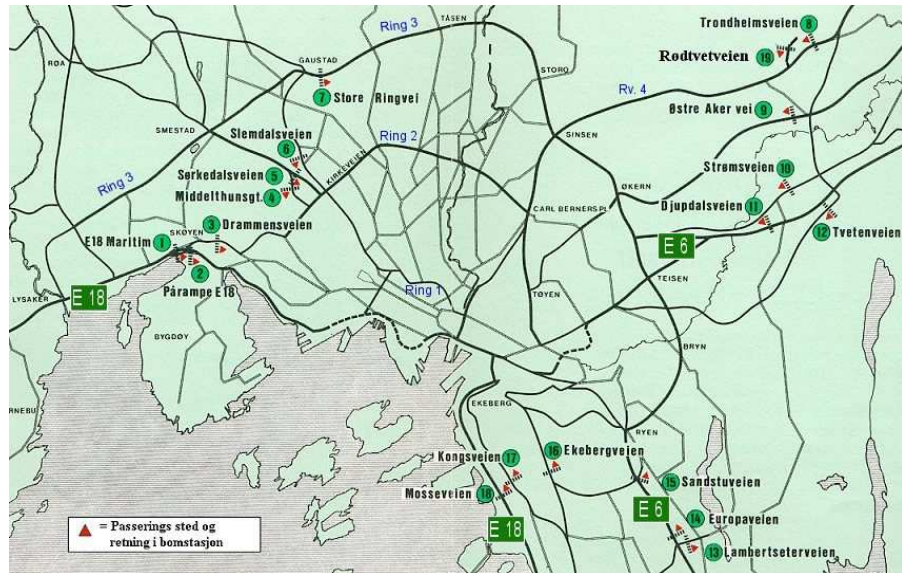
- Coverage by other EU-research projects
- Availability of further information





Example 6.4.1: Oslo	<b>Example 6.4.1: Oslo (Norway) (incl. Bergen, Trondheim)</b>  [Firth 2001; Güller et al. 2000; Waersted 1998]
<b>Key words</b>	<b>Toll ring, cordon pricing, financing infrastructure, Dedicated Short Range Communication</b>
Background	<p>Norway has a 60-year-old tradition of using road toll payment as a financial instrument for building bridges, tunnel and roads. Today it has about 40 different road toll projects, most of them to finance fjord crossings.</p> <p>Among the major cities, Oslo, Trondheim and Bergen have (similar) urban toll systems from which Oslo is described here as an example, highlighting also some particularities from the other two.</p> <p>The Oslo toll ring that charges car users for entering Central Oslo, began operation in 1986, shortly after the Bergen ring. For a long time Norwegian politics have kept its investment in road infrastructure in the Oslo region rather low. In the mid eighties the city and the national government were lacking funds for the planned new infrastructure buildings.</p>
Objectives	<p>The Oslo toll ring was set up in order to alleviate the choking road traffic conditions on the main road network in the city areas in question and to realise publicly financed infrastructure projects within 15 years instead of the usual 30 years. It is intended to raise money for improvements to the road network, originally to finance a fixed number of around 50 road construction projects, among which the E18, a six-lane tunnel under the Oslo City Hall for east-west-through traffic. However, as an environmentally friendly compromise 20% of revenues are earmarked for public transport infrastructure projects (bus and metro terminals, new metro lines, etc.).</p>
Basic approach	<p>The Oslo toll ring is a classic cordon pricing scheme with 19 toll stations circling the centre of Oslo (see Figure 53). People driving into the city centre pay a fee when passing the toll cordon line. Every car accessing the city centre necessarily has to pass a toll station. Leaving the city centre is free. The current configuration of the toll ring allows to optimise revenues (highest possible traffic volume paying) with a minimum of toll station to make the ring complete. Furthermore, availability of space for the toll stations and fairness towards citizens living outside the cordon were other issues. With the adopted solution, 50% of the population of the city are living outside the ring.</p> <p>The current fee is ca. 2 EUR per passage for vehicles up to 3.5 tons and 4 EUR respectively for vehicles above 3.5 tons. There are discounts for monthly, quarterly or annual subscriptions. An annual pass costs 520 EUR</p>

or 1040 EUR respectively. This flat fee is charged every day, day and night.<sup>30</sup> In case of an illegal passing a belated fee can be paid at most Esso petrol stations in the Oslo area to avoid being fined.



**Figure 53: 19 toll stations circle the Oslo city centre [Waersted 1998]**

Technical solution	7 out of the 19 toll stations are operating with more than 5 lanes. The toll stations offer electronic non-stop payment lanes, automatic payment (coin machine) lanes or manual payment (attendant in a toll booth) lanes (see Figure 54). Electronic payment allows passage without speed reduction. Currently the system is being developed to an entirely electronic system.
Institutional solution	The Oslo toll ring is run by Fjellinjen AS, a company charged with the part financing of road and public transport developments in the Greater Oslo Area which it does through raising tolls on the Oslo toll ring. The company is 60% owned by Oslo City Council and 40% owned by the neighbouring Akershus County Council.
Supporting measures	<p>The Oslo charging scheme is supported by the major political parties. It was positively marketed in the beginning as an efficient operation without queuing from day one and by opening the E18 tunnel 14 days before the start of the payment system. Furthermore, there were other arguments and compromises during the process of bundling “the Oslo package”:</p> <ul style="list-style-type: none"> <li>• The toll ring is part of a road infrastructure financing programme including a number of <i>defined</i> road construction projects during a limited</li> </ul>

<sup>30</sup> In contrast, in Bergen and Trondheim, the passage is free at night and during weekends.

period

- The Norwegian Government contributes extra funding to these construction programmes equal to the amount collected from motorists
- Those in favour of driving appreciate the better road network as a result of paying tolls; those against private cars appreciate the principle of extra payment for those driving (Win-Win-Situation)
- As an environmentally friendly compromise 20% of the revenues are earmarked for public transport infrastructure projects. However, this was only accepted after the national Government intervened, threatening to stop national road- and rail infrastructure projects around Oslo.
- The charged fee is rather low and does not really hurt car users.



**Figure 54: Oslo toll ring station (south-west-entrance) [Waersted 1998]**

#### Future possibilities

According to the original agreement, the charges have to be abolished in 2007, when all planned road construction projects will be paid for. However, it is currently discussed, to continue the pricing scheme in an even extended version, using it also for demand management in order to fight congestion and to guarantee easy access to the city centre.

The simplest way to do so would be to introduce much higher fees during peak periods. However, this is expected to meet high resistance based on the possible negative effects for retail businesses within the toll ring. Furthermore it is claimed that this pricing structure would merely hit employees having to reach their job at a certain time.

Results and experiences

The system has been implemented without major problems and is running successfully just as scheduled. There has been little impact on overall traffic levels, but many new roads and public transport developments have been funded. It is estimated that charges would have to be 3 to 5 times higher, i.e. 6-10 EUR, in order to show any considerable effect on the use of private cars.

The initially low acceptance has been increasing slowly. According to opinion polls, one year before the introduction 70% of the city population was against the system. After one year of operation 64% were against, whereas today it is around 50%.

The Oslo toll ring experience shows

- that urban transport problems have to be urgent and funds for infrastructure projects have to be scarce for road pricing to be accepted
- that for a cordon pricing scheme the position of the cordon is crucial
- that national intervention can be necessary in order to overcome local decision problems
- Fees have to be rather high to have a considerable demand effect
- that road pricing schemes are difficult to alter once established
- that acceptance can be increased with a set of “carrot” measures, i.e. supporting measures such as public transport improvements, park&ride facilities, etc.

Additional recommendations from the Bergen toll ring

The company operating the Bergen toll ring gives the following additional recommendations: [[www.brotunnel.no/index.htm](http://www.brotunnel.no/index.htm)]

1. Political and administrative consensus is vital
2. Involve opposing interest groups and build coalitions between them. Get agreements about how to use the money, give something to both sides
3. Present the project as a compromise, a balanced solution
4. Define and treat the scheme as a technical, environmental, financial problem, not as an extra tax
5. Illustrate the benefits: the project must be accompanied by advantages clearly visible to the users, both motorists and environmentalists
6. Something is better than nothing: Incremental approach, demonstration projects, pricing for improved capacity is more acceptable than pricing for demand management
7. Find your own way: There is much to be learned from existing projects, but general recommendations must be adjusted to suit local conditions (traffic conditions, political system, public opinion, etc.)

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Member of BESTUFS who did the material collection:  
Daniel Firth, TFK



**Figure 55: Toll ring station on a minor road [Waersted 1998]**

Example 6.4.2:  
London

**Example 6.4.2: London city 'congestion charging'<sup>31</sup> (UK)**

[Rowe 2001; Egger 2001; Turner 2001; Guttridge 2001; Zunder 2002]

**Key words**

**Time-based, area pricing, demand management, Licence Plate Recognition**

**Background**

Central London suffers the worst congestion in the country. Traffic delays are increasing, costing people and businesses both time and money. Some of the city's major roads carry more traffic than some of the UK's busiest motorways, creating traffic jams and causing stress and frustration to motorists, bus passengers, bikers, cyclists and pedestrians alike.

- Just over one Million people enter central London every morning (more than three quarters of these by public transport)
- Some 30'000 vehicles a day now use each major road in Greater London
- Nearly 2.8 Million vehicles were licensed to addresses in Greater London in 1999
- Car ownership in London is projected to rise by around 10% by 2001.
- Average time taken to travel to work by car is now 53 Minutes
- Average traffic speed in central London fell to below 10 mph for the first time since records began

These figures highlight the need to find a solution to the growing congestion problem in central London. Following lengthy consultation the Mayor of London, Ken Livingston, therefore proposed in 2001 his Transport Strategy for the capital which included - together with other measures - the so called "central London congestion charging scheme". Currently, public consultation is ongoing. In 2002, the next stage is planned to be started, putting in place the technical, traffic and environmental management measures and administrative elements. The earliest the scheme can start is 2003.

**Objectives**

The priority of the proposed charging scheme is to reduce traffic congestion. In addition, all the revenues generated would be invested in transport in London for at least ten years.

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<sup>31</sup> The pricing scheme was given this name officially by its developers as it is tackling congestion. However, 'the London congestion pricing scheme' is not a congestion pricing scheme as it is referred to in the Glossary of this report, because it uses a flat rate instead of a rate varying with congestion.

Basic approach

The principal element of the scheme is a £5 (approx. 8 EUR) flat daily charge for each vehicle (private car or lorry) driving within the central charging area, which will be bounded by what is known as the Inner Ring Road (see Figure 56). Limiting charging to this core area makes sure that there are sufficient public transport alternatives available. Originally, it was proposed that goods vehicles should pay £15, but due to heavy opposition from the freight industry the charged was reduced to £5 (equally for all vehicles).

Anyone driving within the charging area between the hours of 07:00 and 19:00, Monday to Friday will have to register their number plate and pay before 7pm of the day of their travel. Registrations and payment will be possible via telephone, Internet, post or in person at a range of retail outlets. Weekly, monthly and annual licences will be available at a discount. "Late payment" is possible until midnight of the same day, but the charge doubles after 7pm.



**Figure 56: The central London Congestion Charging Scheme Area [Rowe 2001]**

A number of vehicles will be effectively exempted from the charge. These include emergency service vehicles (police, ambulance and fire brigade), London buses, licensed taxis, certain health service vehicles, boroughs operational vehicles, scheduled express and commuter coaches, alternative fuel cars and electrically propelled vehicles, disabled people, motorcycles and certain categories of military vehicles. Residents within the charging



area will get a 90% discount which leaves them paying £130 (ca. 210 EUR) per year.

Legal prerequisites are in place since the Greater London Authority Act in 1999.

The pricing scheme and the proposed fee level aim at modal shift. It is expected that 20'000 people will transfer from their cars to public transport, 5'000 to the tube and 15'000 to buses.

The set-up costs of the scheme are estimated circa 320 million Euro, 160 million for the infrastructure, and another 160 million for secondary measures around the central zone, redefining junctions, traffic lights, roundabouts, etc. 45 million Euro of that set-up money is being held back to fine-tune the system afterwards. Annual revenues are expected to be around 320 million Euro. With estimated operation costs of circa 80 million Euro this leaves net revenues of circa 240 million per year. By law, this has to be spent on improving London's transport system for ten year from the start of the scheme. These projects target expanded rail capacity, new Thames Gateway river crossings, improved access to London's town centres and improvements to London's road system. Thus, the money from congestion charging will enable the necessary improvements in public transport in order to cope with the additional passengers.

Technical solution

For enforcement purposes, Licence Plate Recognition (LPR) technology will be used for checking all vehicles in the area using a network of cameras. One of the major reasons for choosing the LPR approach was that due to terrorist concerns the centre of London has been dotted with LPR systems carrying out security surveillance since the 90s. There will be 180 boundary points where roads cross into or out of the charging zone, some one way, some dual-lane. There will be cameras monitoring every boundary point and also spread throughout the zone (fixed and mobile) recognising every licence plate in the area. The licence plate number will be sent to a central computer where it is checked against the licence database. Those numbers that are not registered on the list will be kept until midnight. If the responsible party has still not paid by then, an £80 (130 EUR) penalty notice (reduced to £40 for early payment) is sent to the official registered keeper of the vehicle.

LPR was chosen for the scheme because it does not require any in-vehicle installations (e.g. OBU) such as smart card or GPS technology.

Supporting measures

The pricing scheme is to be accompanied by a wide range of measures designed to make public transport and other alternatives to car travel easier, cheaper, faster and more reliable. The Mayor is committed to making a real difference to public transport before starting congestion charging in 2003. Further measures include diversion routes, managing "knock-on effects" (e.g. traffic calming, parking measures), signing, improved enforcement of parking and loading restrictions and improved co-ordination of streetworks.

Future possibilities	<p>Even if the described congestion charging scheme should be implemented in 2003 it could certainly be regarded as an interim solution - a system which can be ready by 2003 but can be “upgraded” to a smart card or GPS system at a later date.</p>
Results and experiences	<p>Transport for London has carried out extensive traffic modelling studies to quantify the expected impact the scheme would have. These studies forecast substantial decreases in traffic:</p> <p>Inside the zone:</p> <ul style="list-style-type: none"><li>• traffic would be reduced by 10-15%<sup>32</sup></li><li>• queues would be reduced by 20-30%</li><li>• traffic speeds would be increased by 10-15%</li></ul> <p>Outside the zone:</p> <ul style="list-style-type: none"><li>• traffic may increase on orbital routes by up to 5%</li><li>• traffic would be reduced on radial routes by 5-10%</li><li>• overall reduction of traffic by 1-2%</li></ul> <p>More than 100'000 car journeys per day are likely to be deterred from the central area. Van and lorry journey will reduce slightly from their current level of around 200'000 per day. Taxi, bus and coaches are expected to be largely unaffected. Congestion - measured as vehicle hours spent in traffic queues - in central London is likely to fall between 20 and 30%. This will help essential journeys (such as those by delivery vehicles) to be quicker and more reliable. It will also free up roads and give pedestrians and cyclists a better deal.</p> <p>Nevertheless, a majority of freight transport operators call the planned pricing scheme ill-conceived and unworkable. They claim that goods vehicles should be exempted from the charge just like buses, as they both serve the community. The charge is regarded as a stealth tax, as freight transport cannot avoid it (no alternatives such as public transport) and will not be able to realise any benefits. Further concerns include the induced administrative burdens for transport operators, the claimed ambiguous definition of the area to be charged, the potential problem of licence plate cloning, etc.</p>
More information	<p>David Rowe Service Development Manager, Transport for London <a href="http://www.transportforlondon.gov.uk">www.transportforlondon.gov.uk</a></p>

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<sup>32</sup> this figure roughly equates to the reduction in traffic that occurs during school holidays

[www.streetmanagement.org.uk](http://www.streetmanagement.org.uk)

Example 6.4.3:  
Rome

### **Example 6.4.3: Rome (Italy)**

[Tomassini 2001; Forestieri et al. 2000; PROGRESS 2002]

#### **Key words**

**Access control, cordon pricing, duration of stay charging, Optical Character Recognition, Licence Plate Recognition, On-Board Unit**

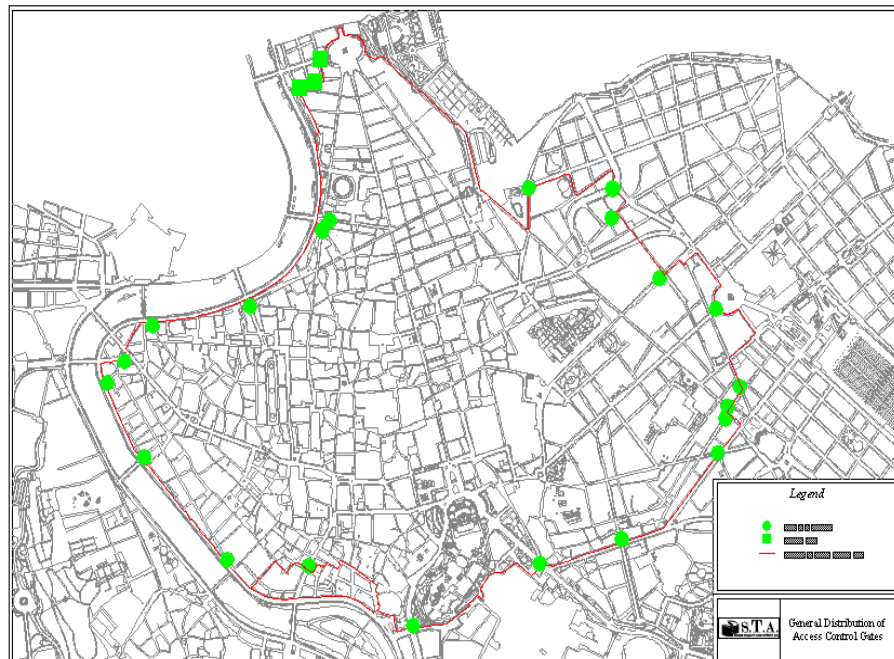
#### **Background**

In the last 35 years in the metropolitan area of Rome, there was a three fold leap in terms of kilometres travelled. This growth has not been matched by a parallel development of the public transport system. Consequently the public transport modal share has sharply decreased and today accounts only for one third of motorised trips. This mode split is further characterised by a large number of private vehicles (about 1'800'000) despite the general lack of parking spaces in the capital. To reverse this trend the municipality approved the Piano Generala del Traffico Urbano (General Urban Traffic Plan) which key elements are the updating of the road classification according to the relative function and the definition of transport demand wielding policies such as controlled access zones and parking pricing.

The history of access control in Rome began in 1989 when restrictions were placed on vehicle entrances to the historical centre. This so called Limited Traffic Zone (LTZ) covers about 5 km<sup>2</sup> and contains major historical monuments, a concentration of government, media and high profile offices, artisan working areas, highly priced residential areas and even a hospital (see Figure 57). Currently the area faces approx. 250'000 trips per day. The access restrictions were not enforced in a systematic way until 1994, when municipal police were used to block the entrances into the area. This manual enforcement of restrictions proved to be a difficult and inefficient process. Therefore the Rome administration has implemented the infrastructure for an automatic access control system that is currently being extended towards an electronic road pricing scheme.

#### **Objectives**

The objectives of the access control system currently in transition towards road pricing are reduction of congestion and modal shift from private towards public transport.



**Figure 57: Limited Traffic Zone with 24 entry gates [Tomassini 2001]**

Basic approach

Access to the LTZ is restricted on weekdays from 06:30-18:00 and on Saturdays from 14:00-18:00. Permission to enter is given free of charge to residents (around 30'000 vehicles) within the ZTL. Other users may obtain permission to circulate and park in the area (approx. 90'000 vehicles) if they fall into certain categories such as freight lorries, doctors with offices in the centre, artisans, etc. Since 1998 these authorised non-residents are required to pay the equivalent of a 12 month public transport pass (340 Euro) in order to obtain an annual access permit. The over 400'000 (!) two wheelers can access the zone for free.

The access control system comprises 24 electronic entry gates able to effectuate without user intervention the identification and/or the applicable tariff for vehicle entrance into the restricted area (see Figure 57). The infrastructure installation will be completed by a series of approx. 29 exit gates (for time-duration charging in a later phase, see below).

Technical solution

Technically the system includes different means for vehicle identification and authorisation depending on the user category and its differing needs. Residents and authorised individuals will primarily be identified through the On-Board-Units (OBU) installed in their cars. The OBU guarantees a secure high-speed transaction with the roadside installations via microwave transponder and allows to debit fares automatically from an electronic purse inside the inserted smart card.<sup>33</sup> In addition the OBU incorporates other user

<sup>33</sup> This function will only be used in the second phase of the project (see below)

needs. For instance, the unit can be activated for the existing electronic toll collection system on the national motorways (TELEPASS), for parking payment within Rome and ensure interoperability with other towns using the TELEPASS technology for access control. . 35'000 on-board units and smart cards have been distributed to residents and handicapped in 2001.



**Figure 58: Smart cards and On-Board-Unit (OBU) [Tomassini 2001]**

Those cars without OBU will be identified and controlled by the Optical Character Recognition (OCR) and Video Enforcement System SIRIO. The OCR image of the licence plate of these vehicles is analysed (Licence Plate recognition) and then compared with the local gate “white list” of authorised (i.e. paid for) plate numbers. Service and emergency vehicles will have their licence plate numbers directly incorporated into the white list, whereas the remaining categories such as tourists have to use a temporary permit procedure for authorisation which then updates with the white list of plate numbers. Privacy concerns are met by destroying any images of legally passing vehicles immediately after the white list check. Only the images of vehicles in violation are stored and used for fining the offender. For the Licence Plate Recognition system the entry gates are equipped with TV cameras and Infrared illuminators (see Figure 59)



**Figure 59: OCR equipment at the entrance gate [Tomassini 2001]**

Institutional solution

The new service management of the automatic access control came along with an organisational redefinition of roles and responsibilities. From the surveillance by urban policemen at the entrance gates enforcement transitioned to a new structure which relies on the identification of violations, remote confirmation of the validity of the violation and issuance of violations.

Supporting measures

The introduction of the new automatic access control system was accompanied by extensive awareness raising campaigns (see Figure 60).

For freight delivery in the ZTL there is a freight delivery reorganisation project including monitoring of the distribution process, loading/unloading reorganisation, incentive programme for promoting better loading factors and low emission vehicles, etc.

Future possibilities

Within the PROGRESS project several road pricing scenarios will be simulated and demonstrated. In a second stage (2002-2003) the incoming non-residents vehicles will be charged per trip instead of the annual fee. In a third phase (2004-2005) charges will vary according to the duration of stay in the area (by use of exit gates).



Figure 60: Example of dissemination material [Tomassini 2001]

Results and experiences

After the start of the automatic access control and enforcement system in August 2001 first experiences indicate that the system is performing with high reliability. The total flow of incoming traffic already decreased by 15% compared to the preceding year. However, there are still over 70'000 vehicles entering per day, 20% out of these illegally - on purpose or due to lack of knowledge.

The handling of special cases such as foreigners to the city, handicapped, etc. turned out to be a key issue for the success of such a system. Specifically the disabled management has proved to be one of the most difficult issues, as national laws require their free transit in any area, both when disabled individuals are in the vehicle and when somebody is dropping or picking them up.

The LZT being a historical town centre, the location and design of the entry and exit gates was a controversial topic. Several planned gate sites, which, based on traffic figures alone, would have otherwise been ideal for gate



locations, were not implemented given the computer simulations of the potential visual impact.

Another key issue for designing the system was to get a clear picture of functional and technical requirements of the service operator. Nevertheless, the transition from the pilot project to the full scale project involved many refinements to the original technical system. The automatic identification of number plates process was improved, the possibility of falsifications of licence plate images were reduced and the general safety of the smart card system was enhanced.

At a local level, institutional aspects have been crucial. Despite the fact that access control had existed in Rome since 1989, converting these manual regulations into a full-scale automatic operation has proved to be a long and complicate process. This is in some ways surprising, given the fact that in Rome consensus exists on the need of access control, funds have been collected for the access permits before already and the basic rules existed previously. Those types of issues that many cities consider to be major obstacles have been handled before. But even under these relatively favourable conditions, the installation of such systems are not to be underestimated.

More information

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Elettronica Santerno S.p.A. (manufacturer of SIRIO system)  
[www.elettronicasanterno.it](http://www.elettronicasanterno.it)

PROGRESS project  
[www.progress-project.org](http://www.progress-project.org)

Example 6.4.4:  
Switzerland

### **Example 6.4.4: Heavy Vehicle Fee / LSVA (Switzerland)**

[Oehry 2001; Egger 2001; BTS 2000]

#### **Key words**

**Distant-related, electronically, area pricing, Heavy Goods Vehicles, On-Board Unit**

#### **Background**

On an average working day about 4500 lorries drive through the Gotthard road tunnel crossing the Alps. In the valleys on the approaches north and south of the Gotthard noise and air pollution frequently exceeds the legal limits. On peak travelling days, traffic jams regularly form in front of the tunnel entrances. Following the general trend in the EU, also in Switzerland the transport performance of heavy goods traffic increased enormously in the last decades. For various reasons the railways became increasingly less able to compete with road transport. Still, in Switzerland the railways carry a far higher share of goods across the Alps than in Austria and France. Among other reasons this used to be partly due to the fact that in Switzerland vehicle weights were limited to 28 tons. However, after the agreement of the bilateral treaties with the European Union this weight limit is being extended to 34 tons and to 40 tons later on. Studies forecasted that this increase in weight limit would lead to a doubling of heavy goods traffic on the Swiss road network by 2015 if no measure were to be taken up.

Facing these problems, Swiss parliament drew a federal law that wanted to replace the since 1985 existing flat fee for Heavy Goods Vehicles (HGV) by a nation-wide distant-related fee, the LSVA (Leistungsabhängige Schwerverkehrsabgabe). A referendum against the law was called. In the subsequent plebiscite on September 27, 1998, the Swiss people adopted the law with a large majority. Subsequently, the LSVA started on January 1<sup>st</sup> 2001.

#### **Objectives**

The main reasons and basic principles for the introduction of the LSVA were:

- Internalisation of external cost of heavy vehicle traffic (principle of true costs)
- Shifting heavy vehicle traffic from road to rail and increasing the rail's competitiveness
- Preventing the forecasted increase in heavy vehicles traffic
- Compensating for the increase in productivity due to the admission of 40-tons goods vehicles that became legal after the bilateral treaties with the European Union.
- Generating revenue for financing large-scale public transport projects, e.g. the New Alpine Rail Transversal (NEAT)
- Bringing the Swiss transit fee for crossing the Alps in line with the

corresponding fees in France and Austria, thus avoiding distortion of competition and ecologically undesirable detours.

#### Basic approach

The basic principles of the LSVA are that it is distance-related (driving more means paying more) and that empty vehicles cost as much as fully loaded ones. It is levied for HGV on all public roads, including both urban and non-urban roads.

The LSVA applies to all domestic and foreign heavy vehicles and trailers for goods or passenger transport with a max. laden weight in excess of 3.5 tons.

The LSVA is levied according to:

- number of kilometres driven on all public roads in Switzerland (km)
- the maximum permissible laden weight (tons)
- emission category of the heavy goods vehicle

This pricing structure aims at reducing overall transport distances and increasing vehicle capacity usage. As the levied fee depends on the emission category of the vehicle too, the LSVA will also influence the choice of vehicles towards environmentally friendlier solutions.

Passenger transport vehicles such as coaches, motor homes etc. are charged a time-related flat fee (no distance relation). There are special regulations for the transport of log, unpacked milk and livestock. Agricultural and public transport vehicles, ambulances and vehicles of the armed forces, police, etc. are completely exempted from the LSVA. In order to improve the competitiveness of intermodal transport pre- and end-haulage for intermodal transport are granted a flat rate refund compensating for the Heavy Vehicle Fee.

Around 54'000 domestic trucks and 30'000 trailers are affected by the fee. In addition, around 20'000 foreign trucks cross the Swiss border daily.

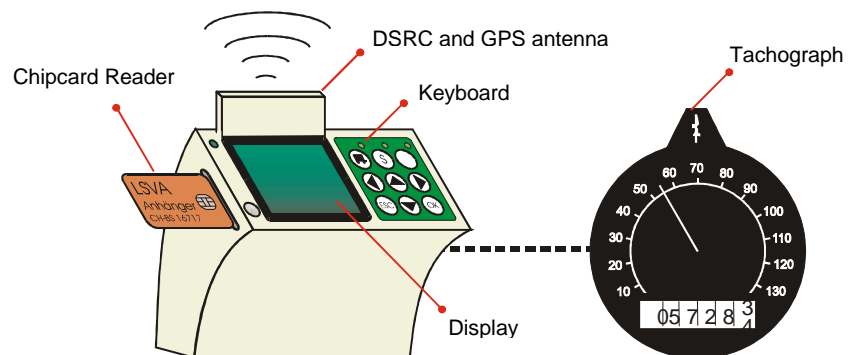
For the years 2001-2004 the following values are applicable:

- Emission class Euro 0: 2.0 Rp. (approx. 1.4 c.) per ton-kilometre
- Emission class Euro I: 1.68 Rp. (approx. 1.1 c.) per ton-kilometre
- Emission class Euro II and III: 1.42 Rp. (approx. 1 c.) per ton-kilometre

For 2005 the Federal Council will set new rates, taking into account technical developments. However, the maximum rate is fixed by 2.75 Rp. (approx. 1.9 cents) per tonne-kilometre. Furthermore federal law states that the fee must not exceed infrastructure costs and external costs related to road transport. With the LSVA the transalpine route from Basel to Chiasso became approx. 6 times more expensive: from 17 Euro (before 2000) to 34 Euro (year 2000) and approx. 100 Euro (LSVA, after 2001). The fee level is a result of both political negotiations and the calculations of external costs.

The revenues of the LSVA are about 1 billion Euro per year. Two third of the

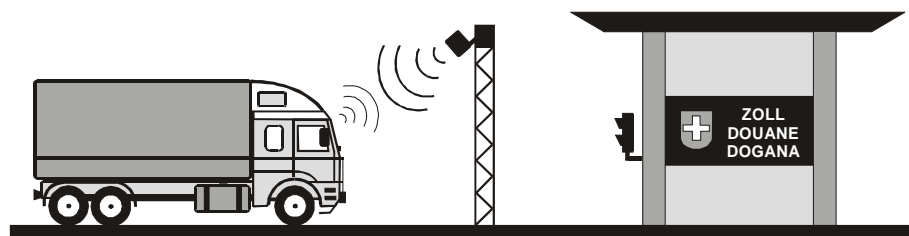
net-revenue are earmarked for federal expenditures for large scale public transport projects (New Alpine Rail Transversal NEAT, Rail2000, TGV-connections, Noise reduction) and for uncovered costs related to road transport. This includes non budgeted road infrastructure costs as well as external costs. One third of the net-revenue is passed on to the cantons (regions), earmarked for (internal and external) costs related to road transport.



**Figure 61: “TRIPON” On-Board Unit [Oehry 2001]**

Technical solution

The fee collection is based on the principle of self-declaration. The liable person (vehicle owner or driver) is obliged to actively participate. For domestic vehicles a On-Board-Unit (OBU) is mandatory (see Figure 61). Foreign vehicles basically are using a ticket fetched at self-service machines. The OBU records the required trip data automatically. The distance is recorded by the tachograph. A GPS sensor and a movement sensor provide a second, redundant measurement in order to make sure that the tachograph signal is not intentionally interrupted or falsified. A Dedicated Short Range Communication (DSRC) air-link is used to switch the recording of the kilometres on and off when crossing the border. Radio beacons are installed over the carriageways at the 82 border crossings concerned (see Figure 62).



**Figure 62: Border crossings recorded with DSRC [Oehry 2001]**

For foreign vehicles an ID-Card issued at the first entry provides for self-service on entry and simplifies the processes on exit. When entering the driver declares the relevant data (mileage reading, trailer status, payment mode) at the self-serving machines and receives a ticket. The whole declaration process takes less than 2 minutes.



**Figure 63: Self serving machine and ID-Chip Card [Oehry 2001]**

Domestic vehicles can drive for a long time within Switzerland without ever crossing the border where the correctness of their recorded data is checked. Therefore checks in the interior are indispensable in order to enforce a correct declaration. The checks do not influence the moving traffic as they are done via the DSCR air-link and by making use of the externally visible lamps of the OBU (see Figure 64). Vehicles with a wrong declaration, e.g. a missing trailer declaration, can be sued.



**Figure 64: LSWA On-Board-Unit from inside and outside the vehicle [Oehry 2001]**

Institutional solution

Domestic vehicle owners monthly declare the fee parameters (distances and weights) to the Swiss Customs Authority SCA. The SCA processes the data, determines the amount due, invoices the vehicle owner and collects the fee. Foreign vehicles declare their trip data when leaving Switzerland. The fee may be settled via a petrol card or via an account held with the SCA. Immediate cash payment is also possible.

Costs and revenues

The rather costly OBU (about 800 Euro each) are distributed free of charge to domestic and foreign vehicle owners until 2004. The installation costs of up to about 300 EUR have to be carried by the vehicle owner. Implementation costs were within the credit limit of 100 Million EUR, plus another 50 Million EUR for the free distribution of the OBU. Operations costs are only 4-6 % of revenues which is very low compared to the usual figures of around 20%. Revenues are estimated to reach around 500 Million EUR in 2001 and 900 Million EUR in 2005. So far, over 45'000 OBUs have been installed, mainly in domestic vehicles.

Supporting measures

The LSVA replaced the existing annual flat fee. It is one component in a whole package of measures that aim at strengthening the position of the railways. Other measures include the new transalpine rail tunnels through the Gotthard and Lötschberg and a rail reform that aims at improving the railway's productivity and competitiveness. Additionally the parliament approved the so called "Transfer law" that grants additional funds to promote rail transport. Furthermore, unaccompanied combined road/rail transport is encouraged by a flat-rate refund per journey that offsets more or less the average LSVA-costs.

Results and  
experiences

The LSVA works. Economically it is very efficient as operation costs account only for 4-6% of the revenues. The effects of the LSVA are currently being evaluated. First results indicate that the LSVA shows the desired effects, but on a rather low level: 4% less lorries have been counted on Swiss roads (compared to an annual 5% increase since 1997). This reduction is attributed to an increase in transport efficiency that is either triggered by the LSVA (restructuring of logistics operations and route planning, higher capacity utilisation) or the increase of the max. weight limit from 28 tons to 34 tons. Various transport operators have optimised their operations or switched to less polluting vehicles. Investments in heavy lorries have increased by 45%. The fear that the LSVA would make transport operators switch to small delivery vans that are exempted from the fee did not come true. Swiss Railways could increase their national freight transport performance by almost 9%. Transit traffic did increase but to a lesser extent than feared.

In the propaganda phase preceding the public vote there was a strong majority of transport operators opposing the project, well organised by the Swiss association of road transport operators ASTAG. A silent minority recognised the chances. After the public vote the LSVA is very well accepted. After the introduction, the Swiss Association of road transport operators ASTAG seized the occasion to adapt their price recommendations. Thus the fee is generally being passed on to the customers. Sometimes it is abused in the sense that the LSVA serves as an excuse to increase prices over-proportionally (known case of a paint pot that would have travelled twice around the world if the stated price increase would really be due to the LSVA). For the transport operators part of the cost increase was offset by the increase in productivity as a consequence of the max. weight limit increase. The LSVA triggered a number of innovations in the transport and logistics sector, from the renewal of whole vehicle fleets to the increased use of intermodal transport.

The following key factors have been decisive for the LSVA's success:

- The project could build up on an existing organisation, the Swiss Customs Authority
- A lot could be learned and improved in tests and field trials
- For public acceptance it was important that the project had been legitimated by the public vote (i.e. heavily attacked before, but democratically accepted afterwards)

From the LSVA experiences the following general conclusions for electronic road pricing schemes can be drawn:

- Demand management through pricing measures works (although high charges are needed to produce considerable effects)
- The impacts are not fully predictable (the market will adapt to pressure, but possible reactions are manifold)

- Processes come before technology: technical solutions have to follow the problem not vice-versa
- Its the procedures for the non-equipped, badly informed user that decide whether a system works or not.

More information

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Example 6.4.5:  
The Netherlands

### Example 6.4.5: Kilometerheffing (The Netherlands)

[Quispel 2001; Kleijn 2001]

#### Key words

**(Complex) area pricing, nation-wide, GPS, GIS, On-Board Unit, data privacy**

#### Framework conditions

Since 1990 the Dutch Ministry of Transport is trying to introduce road pricing in the Netherlands. The permit based project Spitsvignet was followed by the Rekeningrijden project (later called Spitstarief), a cordon pricing scheme for the major Dutch cities (see Annex, project NL-01). In 1999 there were even technical tests carried out, but the support for the system deteriorated quickly. The systems was being seen as unfair and resulting in too much problems with detouring traffic avoiding the fee collection points. The technology and methodology was seen as superseded after an independent ICT expert showed in a study that it is feasible to introduce a kilometre based road pricing system within a time span of 5 years (2001-2006) with the current ICT systems in place (e.g. GSM / GPS) and that the privacy problems could be overcome. This was the start for the Kilometerheffing project that is planned to be starting in 2004 and to be fully implemented in 2006.

#### Objectives

The Kilometerheffing pricing schemes aims at establishing a more fair tax system (user pays principle), improving environment and road safety and reducing congestion by means of demand management.

#### Basic approach

The Kilometerheffing (KMH) is a distance related road pricing scheme based on all roads in the whole of The Netherlands. In the first stage a flat-rate km based tariff will be introduced. After 2006 differentiation to time and place is foreseen. Therefore the design of the flat-rate system already has to be capable to handle differentiated tariffs by time and place of usage.

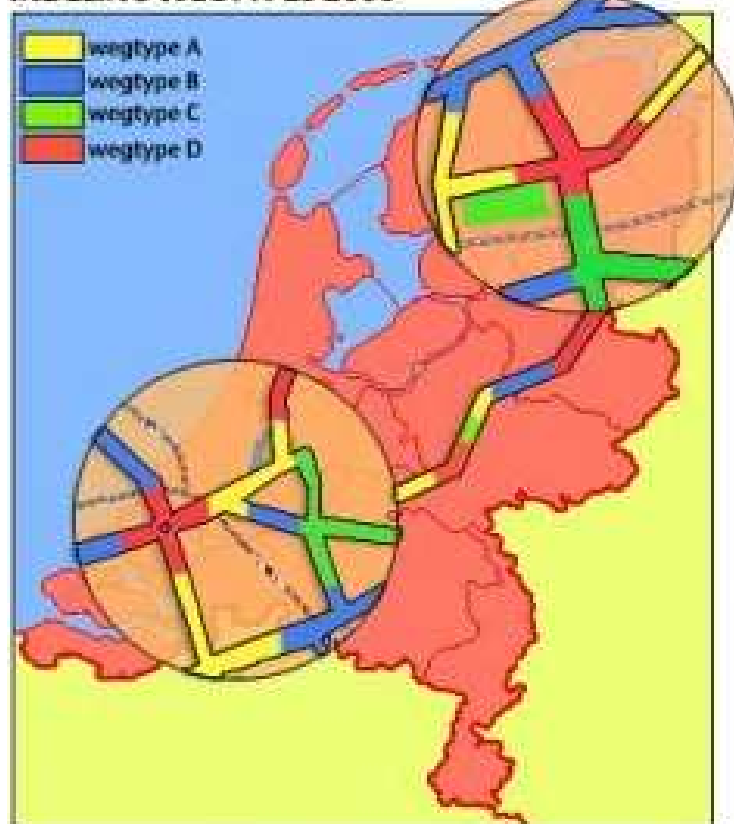
The revenues of the KMH will be fed into the public funds. Fixed taxes (registration tax, Eurovignette, fuel tax and taxes on new vehicles) will be decreased or abolished and will be processed into a variable km-based tariff. Because the revenues of all fixed taxes all are added to the public funds, it is not foreseen that this situation will change. Furthermore, the Ministry assumes budget neutrality for at least the group of private car users. Therefore it is expected that no major additional revenues will result from the KMH. The fee is aiming at tax pressure neutrality for the average car user. When driving below 18,000 km per year one will have less tax to pay, if one drives more than 18,000 km per year the tax pressure increases compared

to the current situation.

Technical solution

It is foreseen to mandatory equip all motor-vehicles in the country with On-Board Units. The OBU does have communication functions (DSRC/GSM/GPRS), locating functions (GPS), a SIM card, a digital map (GIS), memory and a calculation function. The OBU (called Mobimeter) can calculate the road usage costs itself by having a real-time classification of road types to tariff classes (see Figure 65). This information (numbers of kilometres driven per road type or tariff class respectively) is sent periodically (each 1000 km) to a service provider who passes the information to the Ministry of Finance where the bills will be composed. In this way the position and time of road usage doesn't have to be known and so the privacy of the driver is ensured. Furthermore the OBU should be able to communicate with road side equipment (DSRC) for subjection to automatic enforcement systems working with IR/OCR. It is possible to link additional services to the OBU like route navigation, traffic information, road conditions, parking information, entertainment, etc. The standard costs of an OBU will be about 125 EUR (not included installation costs and VAT). The government will be paying for the OBUs and installation costs. In 2003 the mass production of the On-Board Units is planned.

**INDELING WEGTYPES 2005**



**Figure 65: Vehicle position (GPS) is linked to road type and tariff (GIS)  
[Kleijn 2001]**

Institutional solution	<p>The system affects both freight transport and passenger transport. However, currently the legal basis for charging HGV (vehicles over 12 tons GVW) on all roads is not in place. A revision of the European law is required first but this is already announced by European Commission DG TREN. The institutional model is most likely to be a public-private one. Commercial service providers will be used to take care of communication and to disseminate information about actual tariffs; they can collect information that is sent out from the OBUs periodically and they will offer additional services to the users.</p>
Future plans	<p>It is planned to extend the system towards a complex pricing scheme differentiating tariffs according to place and time (after 2006).</p>
Results and experiences	<p>The distance related road pricing scheme is seen as being fair because it is based on “the user/polluter pays principle”. There is no negative effect of income distribution. Therefore the acceptance of the system is in principle high. Initially the privacy of the driver was seen as a potential bottleneck but this will be solved by having a OBU than can make all the calculations itself and thus doesn't have to communicate privacy sensitive information to others. However, the effectiveness of the flat-rate system is not clear to all stakeholders and therefore there are still some discussion about the ex ante success estimations. Furthermore due to the flat-rate some regions with low infrastructure agitate because they fear paying more than their share for the infrastructure in The Netherlands as a whole. This might be a discussion point in upcoming discussion in the Cabinet and the Parliament.</p> <p>The transport operators agree with the introduction of the km-based road pricing system, however they will offer resistance if their tax pressure is increased and if there is some kind of unequal treatment of other (foreign) road users or transport modes. The impact on urban freight transport can not be estimated yet. With differentiation to time and place (planned after 2006), there could be a very substantial improvement of urban freight transport operations.</p>
More information	<p><a href="http://www.roadpricing.nl">www.roadpricing.nl</a> (in English) <a href="http://www.projectkilometerheffing.nl">www.projectkilometerheffing.nl</a> (in Dutch)</p> <p>Member of BESTUFS who did the material collection: Martin Quispel, NEA</p>

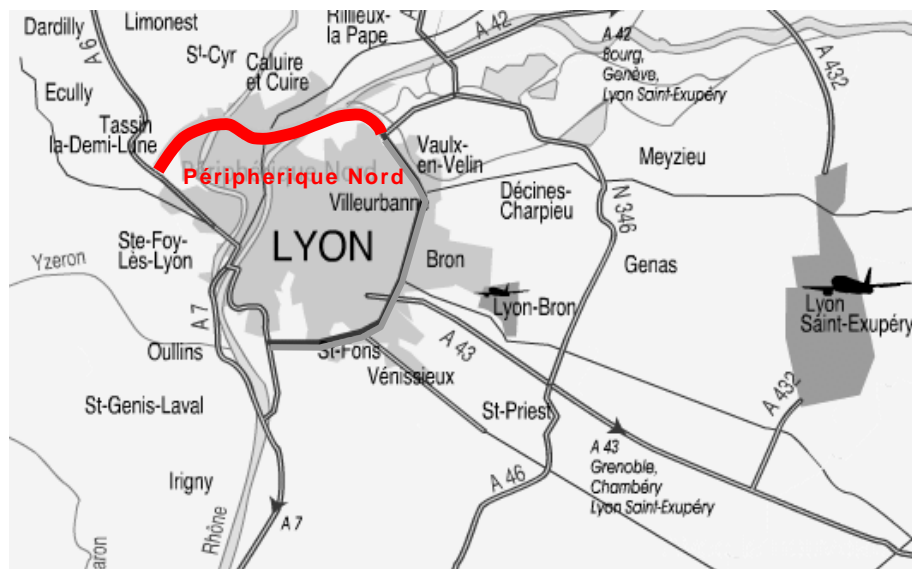
Example 6.4.6: France	<b>Example 6.4.6: Péripherique Nord de Lyon (France)</b>  [Dablanc 2001]
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**Key words**

**single road pricing, financing infrastructure, public protests, communication**

**Framework conditions and objectives**

The Péripherique Nord de Lyon has been the first example of road pricing in the Lyon area, where over 2.3 million car trips are made every day. It consists of several tunnels and a bridge (viaduct) that are part of the northern ring of the city of Lyon (see Figure 66). The main reason for building the Péripherique in 1996 was the increasing congestion in the city and the related difficulties for east-west transit in Lyon. The Péripherique saves the road users a remarkable amount of time and relieves the city centre from transit traffic. Today, around 150'000 vehicles use the Péripherique every day, around 45 millions per year.



**Figure 66: Péripherique Nord de Lyon [www.peripheriquenord.com]**

**Basic approach**

In order to finance the construction and operation of this large infrastructure, a toll is levied around the clock from every motorcar or lorry passing. Around one year after its inauguration the tunnel was closed in 1997-1998 due to legal problems and one summer of heavy public protest. These protests led

to a reduction of the fees, two stretches turned back to free of charge use and alternative local roads were re-enlarged again, after their capacity had been reduced in order to make people use the toll-road. Today the operating company is promoting their scheme by highlighting the time savings, the reliable journey time and the convenience of the passage.

Technical solution

The Péripherique has got 7 access points where payment is made either manually or automatically using the SmartCard based, contactless télépéage system (see Figure 67).

After the reduction of the fees as a consequence of public protests, a single passage currently costs 1.5 Euro for cars, 2.7 Euro for vans, light trucks and buses, 4.6 Euro for trucks with 6 wheels, 6 Euro for trucks with 8 wheels and 7.6 Euro for larger trucks. A “tunnel pass” provides slightly lower fees.

The revenue goes directly to the operating company for operating costs and to the Urban Community.



**Figure 67: Promoting the télépéage system**  
[[www.peripheriquenord.com](http://www.peripheriquenord.com)]

Institutional solution

The Urban Community of Lyon had launched a bid for the construction and operation of the périphérique Nord. A private investor (Société Concessionnaire du Boulevard Périphérique Nord de Lyon) had won the bid and ran the tunnels and the bridge during the first year of implementation based on a PPP contract (concession). Since the temporary closing of the tunnel after the protests in 1997 it is now being operated by a public owned company

after the community of Lyon bought back the tunnel. The operating company is responsible for security, traffic management, fee collection, marketing and maintenance, whereas the owning community of Lyon administers the revenues, fixes the marketing and pricing strategy and supervises all operations.

Results and experiences

The Péripherique Nord de Lyon proved effective and practicable. After initial protests and a subsequent reduction of the levied fees the pricing scheme has finally been accepted. Initial communication was poor and is supposed to account for part of the acceptance problems.

There has been no study on the impact on urban freight transport. The tunnel has probably eased traffic conditions for trucks on local surface roads, but this remains to be looked at precisely.

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## 6.5 From theory to practice

A promising theory	The reviewed examples show that demand management and financing infrastructure through pricing measures can work. Obviously, transport demand and transport decisions are somehow linked to prices, and pricing approaches therefore offer a high potential for improving the transport situation in Europe as it is suggested by the European Commission [2001]. As long as transport prices and taxes are structured in a way that the individual traveller faces mostly fixed costs when travelling by private car whereas he faces mostly variable costs when travelling by public transport, the incentives for shifting modes will never be given. But however compelling the theoretical concept may be, its implementation into the real world comes along with various problems. Without entering into a basic discussion on road pricing we want to highlight some of these problems with respect to the given examples.
Implementation barriers	The concept of social marginal cost pricing we referred to is a theoretical concept for the efficient allocation of resources. The real world is far more complex than the theoretical model and nobody seriously aims at implementing it at a 1:1 scale [Howes 2001]. Still, this does not prove it wrong, nor does it mean that it is useless in improving the current situation. Social marginal cost pricing is a theoretical ideal - but that applies for nearly all economic theories.
Level of charges: the normative power of political reality	The level of applied charges illustrates this normative power of political reality very well. The currently levied charges reflect political negotiations or public acceptance polls rather than economic cost calculations.  Practical schemes have been driven by political reality [Major 2001]. Consequently passenger transport is at the forefront as the majority of voters are private car users (see below).
Price is only one decision factor	On the other hand, the examples show that fees have to be rather high to have a considerable demand effect. We have to be aware that the price is only one - although an important one - among a bundle of decision factors for modal and route choice. Other important factors include comfort, reliability, punctuality, flexibility, security, duration of the trip etc. Estimations for the examples of Oslo and London suggest that urban road charges would have to be in the order of 8 Euro to show any considerable effect on the use of private cars.
Tricky external cost calculation	Another reason for the rather political determination are the practical problems economists face when calculating external costs of urban transport. Some approaches are heavily debated as there are many uncertainties. Consequently estimates for shadow prices for externalities can



	<p>differ more than 100%. On the other hand, determining the fee level politically implies the possibility of pricing being abused in an economically arbitrary way. This is the case if the (total) charges levied are not related to costs anymore. Prices should reflect true costs (internal plus external ones) and be a function of supply and demand rather than of political tug-of-wars. Otherwise they will still distort market mechanism (as almost all taxes do).</p>
Various trade-offs in the real world	<p>As “there is no free lunch” in the real world the implementation of road pricing comes along with various trade-offs illustrated by the assessment triangle (see Figure 44). Certain forms of road pricing are more easy to implement than others that are more sophisticated or more effective. The complexity of the system and the technology chosen are important factors, but even more important is public acceptance and - related to it - whether the legal powers are in place [ITS 2002]. And the most cost-effective solution could also be a very simple one.</p>
Acceptance: the main barrier	<p>The main barrier to road pricing is acceptance, including the general willingness to pay for something that used to be free of (direct) charges, but also data privacy and other concerns.<sup>34</sup> The Oslo experience showed that urban transport problems have to be urgent for road pricing to be accepted. Although it is the main barrier to road pricing, acceptance is often neglected in favour of enforcement. Enforcement is obviously necessary, but a high level of acceptance and societal consensus makes enforcement much easier (comparable to the majority of public transport users that considers fare dodgers unfair). Obviously, the use of the revenues is crucial for the acceptance of a road pricing scheme.</p>
Practicability: the least resistance	<p>The technical feasibility is largely given, although there remain problems to be solved, e.g. concerning interoperability, performance capacity, etc.. There are many different technologies available whose suitability depend largely on the specific case conditions. Because technology is abundant and because the technical problems offer the least resistance, road pricing schemes are likely to be over-sophisticated - neglecting the human factor. Sophisticated systems are complicated to understand and the decisive test for every system is the occasional user who is not informed. The Swiss experience with the Heavy Vehicles Fee (LSVA) showed a main factor of success: technical solutions have to follow the problem - not vice-versa.</p>
Effectiveness and efficiency: not everything feasible is optimal	<p>When implementing road pricing schemes one of the main trade-offs is between economic efficient allocation, i.e. effectiveness, and operational efficiency. The closer we want to get to the theoretical ideal of social marginal cost pricing (i.e. pricing highly differentiated according to time, place, level of congestion, etc) the more complicated, more high-tech, more expensive, more complex and less transparent the system will get (what affects acceptance again). This raises the justified question whether simple solutions such as fuel taxes, emission related vehicle taxes, paper licences, etc. are not neglected in favour of fancy high-tech solutions? Not everything</p>

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<sup>34</sup> The PRIMA project provides extensive studies on road pricing acceptance issues. See chapter 9.2.

technically feasible is suitable. A fuel tax is surely not as effective, differentiated and fine tuned as for instance a complex area pricing scheme, but it is far easier instead and might therefore be a more cost-effective second best solution.<sup>35</sup>

Limited  
transferability

The experiences that have been described above will hopefully be of help for many other projects. Nevertheless, they should be transferred with caution. Every market is behaving differently due to changing local framework conditions. The Swiss experience has shown that the market does adapt to price pressure but that possible reactions are manifold and hard to predict. Local circumstances are particularly important when it comes to acceptance issues. Apart from the local and national general fiscal situation even the local history of politics and taxation can be of influence. The success of any particular road pricing measure is determined by a huge variety of factors, ranging from the availability of public transport alternatives to the spending of the revenues. In fact, the targeted transport patterns of road pricing schemes can even be contradictory: for demand management purposes the pricing measures will aim at high elasticity transports in order to achieve a maximum shift, whereas for financing they will target low elasticity transports in order to maximise revenues. Therefore, one must be very careful when transferring results and comparing situations.

## 6.6 Specific considerations for urban freight transport

Freight sadly  
neglected in urban  
road pricing  
research

In the context of this Best Practice Handbook we cannot enter any further into the surely interesting discussions about urban road pricing as a general concept. Rather we would like to consider some specific aspects of urban road pricing with particular regards to urban freight transport. This seems even more appropriate as most urban road pricing projects consider mainly passenger transport.<sup>36</sup> Freight transport is a rather marginal object of urban road pricing research.<sup>37</sup> For a general discussion of (urban) road pricing issues, the reports of the various research projects mentioned in Chapter 9.2 provide extensive information.

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<sup>35</sup> A theoretical study for the City of Zurich (Switzerland) has evaluated 10 different transport measures, among other a sharply higher fuel tax, area licensing, parking restrictions, etc and found the fuel tax to be by far the most cost-effective [Maibach et al. 1993]

<sup>36</sup> Freight transport is only considered collaterally. There are at least two reasons for this: First, private car traffic usually accounts for the largest share of urban transport with respect to the number of vehicles or kilometres driven. Second, political acceptance is one of the main issues of current road pricing research and private car users form the largest stakeholder group (majority of voters).

<sup>37</sup> This finding from the present material collection is supported by a number of other studies, e.g. a study from the Berkeley University of California that has "identified two areas where previous research especially lacked: the impact of road pricing on commercial vehicle operations, and on transit operations." [Hong et al. 1996]

Highlighting some freight specific aspects

As the BESTUFS workshop on the topic showed, one of the most controversial questions is the potential impact of road pricing on urban freight transport. Therefore, the considerations below focus on the direct impact (charged fee, induced behavioural change) as well as the indirect impact (fiercer competition, better road access) of road pricing.

Pricing mechanism and rational decisions

Road pricing could be particularly effective for freight transport because commercial transport operators, rather than private car users, tend to make their transport decisions based on rational economic considerations (no cost illusion). By charging different fees according to time, distance, vehicle weight, size or even vehicle capacity utilisation, road pricing can influence the logistics and transport strategies of shippers and logistics service providers as well as the transport operators' choice regarding fleet capacity, fleet mix and fleet activity, in other words, the whole freight transport system. However, reality could be different: small one man companies or family businesses might be far from the rationale of economic decision making. Furthermore we have to be aware that also for commercial transport operators price is just one argument among a number of decision factors such as regular availability, reliability, punctuality, flexibility, security, duration of the trip etc. [Ruesch et al. 2000]. However, by reducing overall traffic road pricing can potentially influence these factors indirectly too.

When analysing freight transport decision processes, two decision levels have to be distinguished: the rather long-term strategic level and the rather short-term operational level. The strategic level includes basic decisions on supply-, production- and distribution concepts, location policies, storage concepts etc. and is mainly influenced by shippers and logistics service providers. Mere transport companies have less influence on these decisions. However, as the distinction is not always obvious, shippers and logistics service providers are always included when talking about transport operators in the following.

Direct impact: elasticity of demand and availability of alternatives

For a pricing measure to have large effects it should be applied to goods that have a high price elasticity of demand.<sup>38</sup> The price elasticity of demand depends among other things on the availability of equally good alternatives.<sup>39</sup> While for passenger transport a public transport alternative usually exists in major cities, a shift towards this transport system can be promoted by road pricing for cars.<sup>40</sup> Additionally, the trip planning of private

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<sup>38</sup> Note that the opposite is true for pricing measures aiming at the generation of revenues (financing). Here, high elasticity of demand would lead to less demand for the charged good and thus decreasing revenues.

<sup>39</sup> Considering this, it is not astonishing, that a reasonable public transport system is often found decisive for the acceptance of road pricing by the public.

<sup>40</sup> Not only does the use of roads become more expensive when introducing road pricing. When road pricing is introduced in exchange for existing flat taxes, fixed costs for car owners become variable costs (e.g. kilometre

car users in terms of time and route chosen can be influenced in order to equalise peak hours. [Huschebeck 2001] For urban freight transport the situation is different: there is no public transport or other efficient modes of transport.<sup>41</sup> Furthermore, freight transport is probably less flexible in planning its trips than private car users are, at least in the short run. Urban freight transport business faces “obligatory delivery in the morning hours” [PATS, D3, 75] and “access time restrictions for the inner cities or due to logistical considerations” [Huschebeck 2001]. However, other transport experts believe just the opposite. According to Bjornstad [2001] “people going to and from work have less possibilities to change their way and time for travelling than freight transport”.

Short run effects

However, even in the short run there are probably alternatives in the form of flexibility. Pricing measures could induce a more efficient use of delivery infrastructures and a reconsidering of trip planning and transport patterns, enhancing bundling of consignments and improving the efficiency of the transport business. Charges according to vehicle weight, size and emission could influence the vehicle fleet mix. If this effect will take place and to which extent is heavily disputed and depends on the existing efficiency, the cost structure and decision variables of each transport operator. Those innovative transport companies that have already attained their maximum efficiency level due to the already high competition cannot improve any further. For many others, pricing might be an incentive for optimising their business. For example, this was experienced after the introduction of the Swiss Heavy Vehicle Fee (LSVA) which was not the sole reason for changing business operations, but which was a trigger for innovations up to the complete renewal of whole vehicle fleets.

Price level and the  
business' cost  
structure

It is also argued that road pricing will have no direct substantial effect on urban freight transport because in several cases the charged fees are too marginal to really influence the decision making of the transport company. [Quispel 2001] According to Mr. Guttridge from the British Freight Transport Association, labour costs are that much higher than (other) transport costs that even when you double it, nothing would change in the behaviour. [Guttridge 2001]

Long run effects

Apart from the controversial instant effects, transport operators (including shippers and logistics service providers) have more flexibility of choice in the long run. Transport prices increased by road pricing can influence logistics strategies of shippers and logistics service providers (supply, production, distribution, location, storage). Again it must be considered however, that looking at the costs of logistics structures of large business sectors with e.g. a central depot for whole Europe, the pure transport costs are just about 2%

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based) which stimulates again the use of public transport (less opportunity costs of the car parked in the garage). [Kleijn 2001]

<sup>41</sup> An exception could be courier transport for letters and small parcels by bike, as it is already common - and more efficient - in Copenhagen [Holm 2001] or the Cargo Tram in Dresden.

of the total product costs. Under these conditions a small fee has no structural effects. [Wild 2001] Additionally, urban road pricing can only influence one part of the whole transport chain, namely pick-up and distribution concepts (although distribution costs account for a large part of transport costs).

Furthermore, in the long run road pricing might have even more important effects. If the transport business passes on the charges to its customers, the higher transport prices will eventually induce less demand for freight transport (depending on the retailer's price elasticity of demand). Shop owners might change their logistics and order less frequently<sup>42</sup> or manufacturers could return to larger stocks. The process of the freight operators passing on the charges to their clients is controversial. Experiences with the Swiss Heavy Vehicle Fee (LSVA) indicate however that new charges are passed on sooner or later, sometimes even exceedingly.<sup>43</sup>

If the higher transport prices are passed on to the final consumer, the issue gets even more complex. On the one hand transport intensive, frequently delivered goods (e.g. fish) might get relatively more expensive compared to stocked goods (e.g. cans). On the other hand a price gap could open between urban areas with road pricing schemes and those without which could affect the economic competitiveness of the priced area. The introduction of a road pricing scheme may encourage final consumers who currently drive into the urban area to purchase their goods to shop or spend their leisure time elsewhere, e.g. at out-of-town-shops. It could also have a similar effect on where companies choose to locate their business. In this way, road pricing could result in changes in land use patterns (as businesses choose locations outside the charging zone) and this would lead to changes in goods flows in urban areas. It could therefore alter the locations that goods need to be delivered to.

In general, road pricing might have a positive effect on logistic strategies by cutting or at least cushioning the current trend towards ever decreasing consignment sizes and more frequent deliveries. On the other hand it could even trigger the exodus of shops and businesses out of the priced city centre. The extent to which land use and goods flow patterns change as a result of road pricing are likely to be closely linked to the amount charged in the road pricing scheme and the improvements to the urban area and public transport system that are introduced with the road pricing system. Considering the currently applied and in comparison to overall product costs rather low road pricing fees these effects might well be marginal.

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<sup>42</sup> Just as it is observed with home delivered products shopped on-line: If delivery costs are 1 Euro per delivery customers will order once a day, whereas they order once a week if delivery costs 10 Euro; see Best practice Handbook Year 2 (2001)

<sup>43</sup> After the introduction of the Heavy Vehicle Fee many transport operators, retailers and manufacturers increased their prices with reference to the additional costs. In single cases, the price increase was even abusive.

A net benefit for freight transport business?

Not everyone is expected to directly benefit from the introduction of urban road pricing - although (at least in theory) "the revenue generated from urban road charging would, depending on how it is used, enable everybody to benefit" [ITS Leeds 2001]. It is often argued that urban freight transport would be one of the beneficiaries of urban road pricing. According to the PATS project "it can be concluded with confidence that road user charges would undoubtedly be beneficial for urban freight transport and taxi and probably also for most business travellers" [PATS, D5, final report, 42]. The Institutes for Transport Studies, University of Leeds, sees large scale freight and commercial traffic as one of the "Winners" of urban road pricing. [ITS 2001] The basic rationale behind this statement are manifold:

- Competition effect: fairer competition thanks to differentiated charging according to time and length of the trip; Road pricing harmonises competition as it makes all transport operators participate on the costs of the road usage including foreign vehicles or vehicles from other regions.
- Financing effect: If the revenues generated are spent on road infrastructure, efficiency of road transport business increases.
- Demand effect: The time value of business trips is generally higher than that of private trips. Therefore the elasticity of demand is higher for private car trips. Thus, road pricing will reduce or shift road usage by private cars, reducing congestion and increasing the efficiency of the remaining high value (commercial) trips. Freight transport today is concentrated in a few peak hours during the day which overlap to a large extent with the peak hours of private car traffic. Road pricing could be a good way for using the roads more efficiently through a different spread of transport activities. [Ruberti 2001] This efficiency gain is supposed to be higher than the fee paid resulting in a net benefit. The higher average speed will increase the average load factor (carried tons per vehicle per day) and thus reduce the number of vehicles needed to do the same amount of pick-up and deliveries.<sup>44</sup> [Quispel 2001]

So why are transport operators not enthusiastic about urban road pricing? Apparently, these advantages are not perceived in the same way by all actors, particularly not among the professionals.

Fairness and discrimination in competition

While some argue that road pricing will improve fairness in competition others advocate that it might on the contrary discriminate single actors or regions, e.g. due to the location of their depots. However, this risk should be possible to overcome through intelligent design of the pricing measures.

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<sup>44</sup> From an ecological point of view this would have the desired effect of reduced emissions. On the other hand, increased efficiency would also reduce freight transport prices per ton-kilometre again which might trigger even more freight transport.

Infrastructure is already paid

It is advocated against the argument of financing effects benefiting the users of road infrastructure, that freight transport is already paying for the use, maintenance and improvement of road infrastructure (what in some countries, e.g. Switzerland, it does indeed). While this might well be true in some cases, this point has to be analysed carefully on a case to case basis considering the whole tax system applied in the city, region and country. However, the argument gets meaningless when it comes to road pricing for demand management. As a matter of fact most pricing schemes implemented were finally accepted because they are using their revenues for road infrastructure. Pricing schemes for demand management are more likely to be rejected.

Revenue spending

Obviously the use of the revenues is crucial for the acceptance of a road pricing scheme. However, the question of revenue spending cannot be answered generally and has to be looked at on a case to case basis.

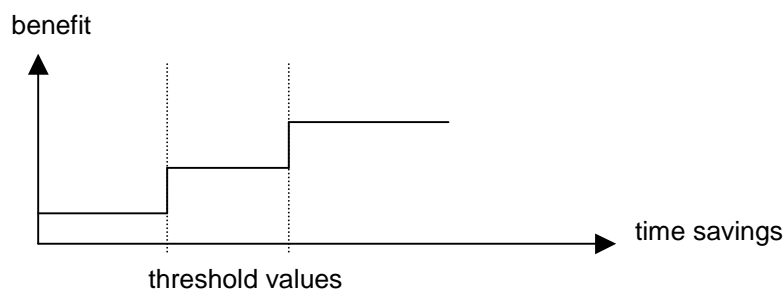
The different perceptions of benefits ...

A closer analysis of the highly disputed demand effect and its potential benefits for freight transport operators and shippers reveals that it is not only the effects themselves that are disputed (unknown elasticities of demand of private car users as well as transport business). Also the benefits resulting from these effects are valued differently which explains part of the disagreement. While for the promoters benefit is simply time-savings multiplied by time value, it is more complex for the opponents. Says Mr. Guttridge from the Freight Transport Association: five minutes saved only mean a longer coffee-break for the driver.<sup>45</sup> [Guttridge 2001] Apparently, time savings do not linearly translate into economic benefit. A three minutes time-saving is not enough for an additional trip or even delivery stop. The relation between time-savings and benefits depends on various criteria that are specific for each transport company (cost structure, vehicle use profiles etc.), but it could probably look rather like a stair than like a straight line (see Figure 68). Time savings only get relevant if the number of stops per vehicle can be increased. This is often forgotten when talking about time-savings benefits.

Time losses surely are a problem for transport operators, but an equally or even more important issue is reliable and precise delivery, i.e. predictable road conditions. It seems at least plausible that road pricing could lead to an improvement in this respect. [ITS 2001]

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<sup>45</sup> Although of course this break might create intangible or long-run value in terms of more alert drivers, i.e. less accidents and damages, higher service level and better motivated employees.



**Figure 68: Time savings and benefits**

... and costs

Naturally the potential gross benefit of road pricing for freight transport operators comes at a cost.

Eventually, the freight transport operator is imposed additional administrative costs, depending on the design of the pricing scheme.

Another cost is the actual fee for road usage charged on the freight transport operators too. From a competitive market's point of view this is not a problem, as all competitors in the market face the same, although new conditions. In the contrary, competitors from abroad have no longer a competitive advantage (see above). It is often argued that road pricing would distort inter-modal competition in favour of other modes than road. While this might be true for inter-urban road pricing schemes, it is not that much a problem for urban road pricing, as there are virtually no efficient modal alternatives to road in the urban freight transport market.<sup>46</sup> The Swiss Heavy Vehicle Fee (LSVA) follows a particular approach in this context: pre- and end-haulage for intermodal freight transport are provided a flat fee refund in order to promote intermodal transport.

The real cost for freight transport is that competition will get harder and that margins will become smaller in the short run. In the long-run, the new charge will probably be passed on to the customers and freight transport prices will rise. This in turn might reduce demand for transport which would make the market contract [Baker 2001]. Thus, urban road pricing might lead to a concentration process in the freight transport market. Considering this, the reluctance of some freight transport operators against road pricing becomes understandable from their point of view, which of course is not necessarily in line with the overall welfare of society.<sup>47</sup>

<sup>46</sup> Of course it is absolutely desirable from an efficient pricing point of view that all modes of transport equally pay their costs, on urban roads as well as on inter-urban roads.

<sup>47</sup> With respect to social welfare it is also argued, that increasing competition could lead to socially undesirable cost cutting measures such as neglecting safety standards and cutting jobs. [Louillet 2001] This argument is popular in relation with almost any political topic. It is a political question if a society values a certain number of



The fear of increasing transport prices proves at least two things:

- that also the transport operators opposing urban road pricing believe, that there is a correlation between price and demand (the basic idea of road pricing), thereby proving the rationale of the concept
- that the objectives of society (less negative impacts due to transport) as a whole are not necessarily in line with the objectives of the transport industry (maximising profits).

Freight transport  
operator's Cost-  
Benefit-Analysis

In order to create a net benefit for freight transport operators, the charged fee would have to be high enough to make private car users shift (reducing congestion) and low enough for transport operators not to offset the benefits it creates for them. The analysis is complex, as these benefits depend again on the (unknown) elasticity of demand of private car users, as well as a number of other factors such as the overall demand level, congestion level, etc. There are many unknown parameters in this Cost-Benefit-Analysis. However, it is quite possible, that most fees currently charged for road usage are too low to create a net benefit for freight transport. If the fees were higher they would not be accepted by the private car users - which form the majority of the voters. Following this argumentation line, the transport industry, which is mostly opposing urban road pricing, should - paradoxically - advocate for higher fees.

Summarising this brief and rough assessment it can be supposed that road pricing could well create a beneficial net effect for urban goods transport operators - although not for all of them. Increased transport costs will make the goods pick-up and delivery market harder, competition will increase, margins will get lower in the short-run and overall demand for goods transport might not grow that fast as expected without pricing. For those staying in the market the potential efficiency gain from pricing might offset or even outweigh the nominally increased transport cost, reducing real operating costs per unit. But even with increasing real transport costs (equally for all competitors!) active and innovative transport operators have a comparative advantage, as higher transport prices will put storage, innovative logistics and intelligent vehicle capacity utilisation back into the spot-light of economic considerations.

Experiences with the Swiss heavy Vehicles Fee (LSVA) indicate that road pricing increases competition on the transport market, triggering innovations and benefiting innovative operators.

Efficient pricing ?

Cost-Benefit-Analysis from the transport operator's view tries to explain the rationale of transport operators being in favour or against road pricing

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jobs in transport business higher than the benefits from less transport. Obviously, less lorries driving around means less drivers driving them.

measures. Although these considerations are illuminating with respect to certain stakeholders' acceptance and the related marketing issue, they tend to distract from the initial idea of efficient pricing. It is not the objective of efficient pricing to benefit a certain category of stakeholders, but to allocate resources (road infrastructure in this case) efficiently in order to increase overall economic welfare of society. Transport operators often argue, that they do not want to pay "for nothing". But even if their individual cost-benefit analysis turns out to be negative, they do not necessarily pay for nothing, they could well pay for their external costs. This brings us back to the calculation of external costs - which is controversial too, but another story.

## 6.7 Conclusions and recommendations

### 6.7.1 Conclusions

Still in its infancy

Road pricing is well known for financing infrastructure in southern European countries on motorways and in a number of cities in Norway. But when it comes to urban road pricing for demand management and the underlying economic idea of true costs, internalising external costs or social marginal cost pricing, road pricing is still in its infancy. Although from an economic point of view the theoretical concept is very compelling, its implementation into the real world faces various hindrances:

- apparently urban transport problems are not pressing enough for road pricing to be accepted yet (lacking willingness to pay, data privacy, social equity concerns etc.). With the forecasted growing transport volumes in mind, road pricing acceptance is expected to increase in the future.
- trade-off between the economic ideal of a fine tuned pricing differentiated according to a large number of factors and operational efficiency: not everything technically feasible is suitable. Economically second best solutions can be simpler (low-tech) and thus more cost-effective.
- practical calculation of external costs are not undisputed either. Fees have to be rather high to have a considerable demand effect.
- results and experiences are difficult to transfer due to the huge variety of different concepts and the high dependency on local framework conditions

...but many initiatives (Norway, UK, Italy and more)

Although the operating urban road pricing schemes are rather few, there are a large number of initiatives going on and projects planned, particularly in Norway, the United Kingdom, Italy, Belgium and the Netherlands. From the reviewed projects the following conclusions can be drawn:

- Almost all urban road pricing schemes equally apply to both passenger transport and freight transport
- Yet the projects usually focus mainly on passenger transport. Freight transport should therefore be better integrated in the future
- Practical schemes have been driven by political reality (negotiations) rather than economic theory (cost calculations)
- Most implemented schemes are designed for financing infrastructure, demand management is more difficult to realise

- Most road pricing schemes follow an incremental approach: from simple to complex. Differentiated charging according to distance or even duration of the trip is scarce, most schemes charge a flat rate during a certain time window.
- Because technology is abundant and because technical problems offer the least resistance, road pricing schemes run the risk of being over-sophisticated, thereby neglecting the human factor

Influencing urban freight decision variables...

Although most urban road pricing projects focus mainly on passenger transport, freight transport is equally affected in a collateral way. From the top decision variables of freight transport operators and shippers [Ruesch et al. 2000], road pricing does not only influence prices. By potentially reducing passenger and overall traffic it might also increase the transport business' efficiency by improving

- reliability
- punctuality
- duration of the trip
- security.

... thereby solving urban freight problems

Main problems of urban freight transport include suitable loading/unloading infrastructure, city access, noise, pollution etc. [BESTUFS 2001b, COST 321 1998]. The main problem in the future with urban freight transport will be congestion - and to a lesser extent danger to other road users and visual intrusion. [Quispel 2002]. In brief, urban freight transport is facing an efficiency problem which is getting increasingly prominent due to decreasing consignment sizes and more frequent deliveries.

- Road pricing can contribute to improve the efficiency of urban freight transport.
- Road pricing can contribute to the solution of a number of urgent urban freight problems such as noise, pollution and congestion.
- In the medium and long run, road pricing could eventually contribute to more sustainable logistics- and distribution strategies and to a more sustainable urban freight transport.

Particularities of freight transport

Freight transport is likely to react differently to road pricing than passenger transport due to a number of reasons:

- commercial transport has a higher trip value, thus a lower elasticity of demand
- commercial transport operators tend to take their decisions based on

rational economic considerations (no cost illusion)

- for freight transports there is no efficient alternative transport available. Yet, pricing sets an incentive for optimising the freight business processes.

Does freight transport gain?

Urban freight transport is often quoted as one of the beneficiaries of urban road pricing, mainly for two reasons:

- because time value of business trips is generally higher than that of private trips, road pricing is expected to reduce road usage by private cars, reducing congestion and increasing the efficiency of the remaining high value commercial trips.
- road pricing harmonises competition as all transport operators participate on the cost of road usage including foreign vehicles or vehicles from other regions.

A variety of opinions

Nevertheless, freight transport professionals are rather sceptical against road pricing. Still, their attitude is far from homogenous, ranging from complete rejection to the expectation of benefits.

Cost-Benefit-Analysis

In order to create a net benefit for freight transport operators, the charged fee needs to be high enough to make private car usage decrease and low enough for transport operators not to offset the benefits it creates for them. For these benefits come at a cost which is less the fee itself and the administration costs it creates (they might be passed on to the customer), but rather a shrinking transport market with increased competition and lower margins. But even with increasing real transport costs (equally for all competitors!) active and innovative transport operators have a comparative advantage, as higher transport prices will put storage, innovative logistics and intelligent vehicle capacity utilisation back into the spot-light of economic considerations.

Experiences in Switzerland indicate that road pricing increases competition on the transport market, triggering innovations and benefiting innovative operators. Still, many impacts of urban road pricing remain unclear, particularly with respect to urban freight (see below: knowledge gaps).

Confirming the rationale of the concept

If freight transport operators oppose road pricing, because they fear a contraction of their market due to increased transport prices, they implicitly confirm the basic idea of road pricing: that there is a correlation between price and demand.

### 6.7.2 Recommendations

Recommendations  
on project / city  
level

Urban road pricing has proved a promising concept with a number of advantages. But the implementation of road pricing schemes has also showed to be a long and complicated process which must not be underestimated - even under favourable conditions.

Although the transferability of experiences was found to be limited due to the big variety of different framework conditions, objectives and concepts (see point 11 below), the following recommendations can be given from the assessed projects:

Designing the  
scheme

1. The concept design should follow the problems
2. The technical solution should follow the concept design - not the other way round
3. It is not the majority of ordinary users, but the handling of the few non-equipped, uninformed or handicapped that is crucial for success
4. The design of the road side equipment can be delicate as it is often installed in sensitive historic areas (town centre)
5. Include all actors of the transport system, including freight transport, into the designing process

Communicating it

6. Political and administrative consensus is vital
7. Involve opposing interest groups and build coalitions between them. Get agreements about how to use the money, give something to both sides
8. Present the project as a compromise, a balanced solution
9. Define and treat the scheme as a technical, environmental, financial problem, not as an extra tax
10. Illustrate the benefits: the project must be accompanied by advantages clearly visible to the users, both motorists and environmentalists
11. Something is better than nothing: Incremental approach, demonstration projects, pricing for improved capacity is more acceptable than pricing for demand management; first simple, then complex

Adjusting to local  
conditions

12. Find your own way: There is much to be learned from existing projects, but general recommendations must be adjusted to suit local conditions (traffic conditions, political system, public opinion, etc.)

Freight neglected

The existing practical schemes have been driven by political reality. Consequently, research focussed on passenger transport as the majority of voters are private car users. Freight transport has been sadly neglected by urban road pricing research. Although many advocates of urban road pricing stress that urban freight business will benefit from road pricing measures (better road access, increased reliability, etc.), there has been no scientific evidence on this point so far. Even the supposed beneficiaries themselves do not believe in their chances. As Mr. Guttridge from the Freight Transport Association says: "Does urban road pricing lead to less congestion? ... Maybe it has no impact at all, we do not know" [Guttridge 2001]

We therefore strongly advise that freight transport should be considered integrally in future road pricing projects.

Knowledge gaps

From the above said it has become clear that road pricing is neither an easy task nor a clear cut case. Not only are its objectives heavily disputed, but also the concept itself, its potential impacts and its effectiveness are doubted. Whereas the first point is subject to societal discussions and the democratic process of building up a political will, it is the task of scientific research to answer the remaining questions of the second point, thereby providing best available knowledge as a basis for sound and legitimate political discussions.

With regard to urban freight, the following questions have been identified:

Direct impact on urban freight?

- Will road pricing trigger a change in the behaviour of freight transport operators and shippers?
- Which level of fee is necessary to do so (cost structure of transport operators)?
- What are the decision variables for the behaviour of shippers and transport operators for urban distribution (fleet mix, route planning, etc.) in the short and long term?
- What options to react has the freight transport industry? Are there any options for efficiency improvement or is transport business already operating at its maximum efficiency level?
- Will freight transport prices increase and will the demand for freight transports adapt - and to what extent?
- Which medium and long term effects on logistics structures and transport strategies are to be expected?

Indirect impact on urban freight?

- Does urban road pricing lead to less congestion - under which conditions and to what extent?
- How does this eventual decongestion translate into benefits for urban

freight?

- How to combine and integrate road pricing for passenger and freight transport?
- What could the consequences for the urban freight transport market be?

Research  
recommendations

Considering this lack of knowledge in the light of a number of road pricing initiatives currently being pursued, it is strongly recommended that further European and national research programmes investigate the issue of road pricing and urban freight. Research activities should analyse both direct impacts (charged fee and induced behavioural change) and indirect impacts (fiercer competition, better road access, changes in logistics patterns) of different road pricing schemes on urban goods. Short-run and long-term impacts are to be considered, especially with regards to behavioural change and economic decisions. Depending on the direct impacts on all transport actors, both private and professionals, several indirect impacts on the urban freight transport system (efficiency, competition, market share etc.) and on the demand for urban goods will have to be distinguished. The analysis might include a cost-benefit-analysis of urban road pricing from the goods transport operator's and from the city and region authorities' point of view.

Improving the road  
pricing discussion

The research should reveal the impact of different road pricing schemes on urban freight transport operations. By clearly linking different road pricing measures to their various effects this research will help to improve and legitimate the frequent discussions about urban road pricing. By establishing a cost-benefit-analysis of urban road pricing measures from the freight transport operator's view the research will contribute to further clarify the most relevant of all road pricing obstacle: stakeholder acceptance.



## 7 Urban freight platforms (UFP)

### 7.1 Introduction

#### 7.1.1 Background and need for action

Why freight  
platforms ?

As urban activities require the supply of goods and the disposal of waste for consumption and production, there is little scope for reducing goods flows to and from cities. Previous research shows however, that the distribution of urban goods is not organised efficiently and that there is considerable scope for reducing urban goods traffic (vehicle-km) through co-ordination and consolidation of transports. [COWI/NTU 1996]

To reduce urban freight traffic and to shift long distance freight traffic from road to rail, the concept of freight platforms was developed. [REFORM 1999] The first freight centres in Europe were established in Paris during the mid 1960s in response to urban congestion. Urban Distribution Centres (a type of consolidation centre) were developed in the UK and later in the Netherlands and Monaco. Several countries included the development of freight centres in their national policies. Italy was the first in 1990, followed by Germany in 1992 and France in 1993. [Visser et al. 1999] In particular consolidation centres for collection and delivery activities were a prominent topic in the 1990s in connection with city logistics activities.

A phase-out  
model ?

Today, this trend has slowed down again after some projects could not fulfil their optimistic expectations. In spite of this process of disillusioning we believe that urban distribution and freight centres might well experience a revival in the future and should be assessed in the Best Practice Handbook, because:

- the need for urban distribution and freight centres has been growing due to decreasing consignment sizes, higher delivery frequencies and smaller stocks
- shippers tend to increasingly outsource their logistics activities
- freight providers will increasingly find themselves barred from cities or city centres
- urban distribution and freight centres can help in assuring the goods supply of a city and in handling the collection and delivery traffic efficiently
- they offer potential for city logistics
- their integration into the urban area is difficult
- securing urban areas for such activities requires active urban land use planning

Finally, COST 321 [1998] promotes “Goods distribution centres” and “regional rail network in combination with urban Distribution Centres” as well as “Optimisation of distribution systems including transport systems” among the 10 most promising measures for improving urban freight transport according to an expert working group.

BESTUFS  
workshop in La  
Rochelle

Consequently “Land use planning and business models for urban distribution centres” had been chosen as topic for the 7<sup>th</sup> BESTUFS-workshop that took place in April 2002 in La Rochelle (France). Due to the positive response of the workshop and the lasting actuality of the topic it was decided to incorporate the topic “Urban freight platforms” into the third Best Practise Handbook (2002) within the BESTUFS project.

### 7.1.2 Definitions and classification

The concepts of freight centres or platforms are very different among countries and authors. Similar things are named differently and different things are named similarly. It is necessary to clarify at least four terms: Freight platform, Urban Distribution Centre (UDC), Freight village and City logistics.

Freight platforms

According to REFORM [1999] freight platforms can be defined as areas in which different transport related companies such as forwarders, logistic service providers etc. are established. It is a transshipment area where, ideally, at least two transport modes are connected. Usually these transport modes consist of road and rail, but waterborne and air transport can also be integrated. The concentration of transport related companies inside a freight platform promotes synergies and primary effects, if the process of integration is planned and enforced in co-operation with all the companies and with involved local authorities.

In short, a freight platform integrates on a concentrated area modes, carriers and services related to logistics and freight transport. Important functions of freight platforms include (see Figure 69): [based on REFORM 1999]

- Integration of different modes and carriers
- Hub/Gateway
- Starting point for pick-up and delivery transport (including bundling)
- Storage of goods (hazardous goods, cooling, etc.)
- Handling of goods (packaging, commissioning, etc.)

- Provision, repair and maintenance of vehicles, containers, transshipment equipment
- Provision of infrastructure such as rail tracks, parking, etc.
- Provision of areas for internal services such as customs, security services, information systems, training and consulting

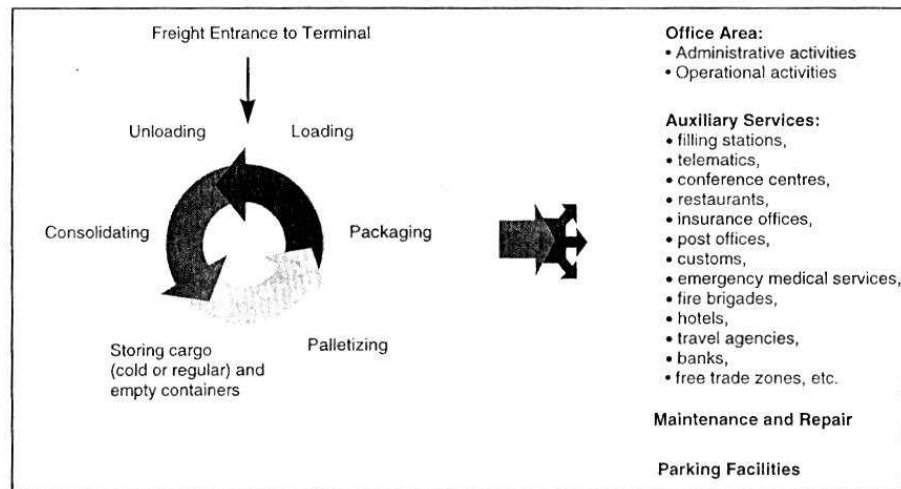


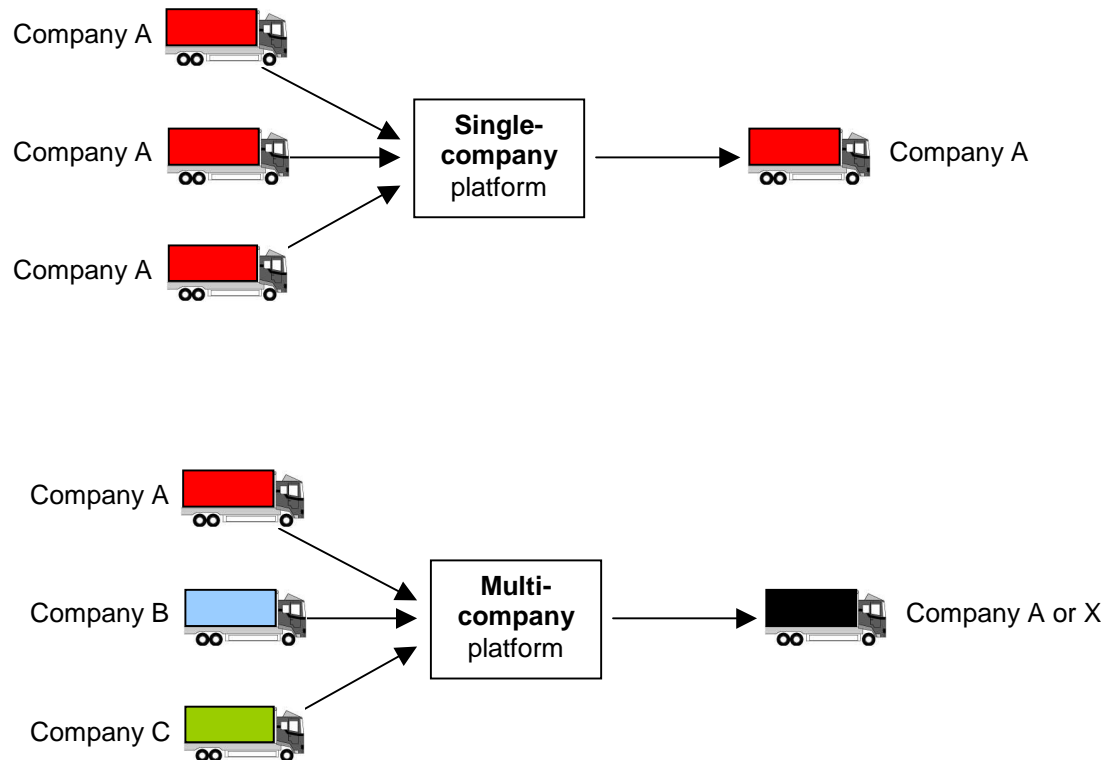
Figure 69: Activities on a freight platform [REFORM 1999, p. 8]

Classification  
criteria

The wide spread of different freight platforms and the variety of names and terms call for further structuring and classification.

Classification criteria for freight platforms include:

- **Company structure:** single or multi-company freight centres. In this handbook the differentiation between single and multi-company platforms does not necessarily refer to the owner or operator of the platform but rather refers to the question if the platform does process freight from only one or from several transport operators. A classic single company platform is a freight platform where a large retailer bundles and consolidates his goods for more efficient transportation and distribution. A multi-company platform might be shared between several transport operators but might as well be operated by only one transport operator receiving freight from any other transport operator willing to pay for the service (see Figure 70).



**Figure 70: Single-company and multi-company platform**

- **Spatial** orientation: urban, regional, national, international
- Transport **modes and intermodal access**: Road, rail, barge, sea, air, pipeline
- **Institutional** solution: private or Public Private Partnership
- **Main aims**: optimisation of logistic operations, urban traffic reduction, modal shift, regional economic growth.

These characteristics are not independent and form more or less typical combinations. Figure 71 combines company structure, institutional solution and main aims.

	private	PPP
single company platform	<p><b>mainly private aims:</b>                      optimisation of logistics and transport operations through internal re-bundling and economies of scale (centralisation)</p>	/
multi-company platform	<p><b>mainly private aims:</b>                      optimisation of logistics and transport operations through bundling between companies and economies of scale (co-operation)</p>	<p><b>private and public aims:</b>                      optimisation of logistics and transport operations, traffic reduction during delivery, modal shift, regional economic growth</p>

**Figure 71: Company structure versus institutional solution of freight platforms**

Table 8 gives a classification of freight platforms based on the results of the REFORM projects and on Visser et al [1999]. In the real world, the borders between the different types of platforms are usually blurred.

Urban Distribution Centres (UDC)

According to COST 321 [1998] an Urban Distribution Centre (UDC) is a place of transshipment from long distance traffic to short distance (urban) traffic where the consignments can be sorted and bundled. Its main purpose is to achieve a high degree of collection in the goods flows in order to supply efficient transport from the UDC to the city centre and vice versa. [van Duin 1995] It is this focus on distribution efficiency and it's city orientation that separates the UDC from other freight platforms. Therefore UDCs are sometimes also referred to as **city terminals** or **urban consolidation centres**. They can be stand alone platforms of a single forwarder or an element in the logistic chain of huge companies. More common however is the integration into logistic urban networks. Connected to freight villages in the outskirts, they are used as central urban, multi-company consolidation centres. [REFORM 1999]

**Table 8: Classification of freight platforms [based on REFORM 1999 and Visser et al. 1999]**

	<i>Terminal development</i>		<i>Area development</i>				
	<i>Intra-company synergies</i>	<i>Inter-company synergies</i>	<i>Transport oriented</i>	<i>Transport + other</i>	<i>Industrial + some transport</i>	<i>Port related</i>	
	<b>Single-company Urban Distribution Centre</b>	<b>Multi-company Urban Distribution Centre</b>	<b>Freight village</b>	<b>Industrial and logistic park</b>	<b>Business Grouping Developments</b>	<b>Special logistic area</b>	
Transport modes	road-road road-rail	road-road road-rail	road-road road-rail-(barge)	roads-road road-rail	road-road	road-sea/air road-rail-sea/air	
Main aims	optimisation logistic operations	optimisation logistic operations, urban traffic reduction	modal shift, urban traffic reduction	regional economic growth, modal shift	revitalising small and medium sized firms	regional economic growth	
Company structure	one single huge forwarder, retailer or transport company	co-operating transport companies	mostly small companies	large industrial companies and transport companies	wholesalers and transport companies	international oriented companies	
Land use	small areas in urban areas or in the outskirts	small areas in urban areas or in the outskirts	large areas in the outskirts	large areas in the outskirts or at old industrial areas	large areas in the outskirts	near airports and harbours	
Spatial orientation	<b>urban</b>	<b>urban</b>	<b>urban</b>	regional	regional and international	urban and regional	international

**grey shading: scope of this Best Practice Handbook**

City Logistics

Rather close to this definition is what Eisele et al. [2000] describe as **City Logistics**: “...all co-ordinated measures comprising logistic collection and delivery activities of logistic service providers in urban areas that aim at the reduction or prevention of commercial traffic and its negative external effects.” However, the notion of City Logistics differs a lot between countries. This quite narrow notion of City Logistics is rather common in Germany, whereas particularly in the English language areas city logistics is a rather generic term that includes much more than bundling of deliveries or a UDC.

Although the presence of a freight platform is not a pre-condition for City Logistics, both concepts benefit from this combination. [Visser et al. 1999]

Freight villages

**Freight villages**, generally, focus on bi- or multimodal transport. The distinguishing element of these platforms is the transshipment terminal. Service providers are established on site, as well as a large number of forwarders and transport companies. [REFORM 1999] Actually freight villages are areas with several terminals [Visser et al. 1999] which can even include an Urban Distribution Centre when located close to city borders, interfacing with long distance transport and city distribution services. On the other hand some freight villages are used as transshipment points on a European scale. In Germany and Italy, freight villages are known as Güterverkehrszentren (GVZ) and Interporti respectively. [REFORM 1999]

Characteristics of a freight village are: [Huschebeck 2002]

- Transport related activities (transport, forwarding, warehousing, additional logistic services, telecommunication etc.)
- Link to minimum two transport modes but not necessarily located within the area of the freight village
- Settlement of different economically independent companies and
- Exploiting the synergies e.g. through development companies (advising planning and development processes).

It is expected that freight villages are contributing to a shift of freight transport to other modes, to the avoidance of transports and to a reduction of transport processes within urban areas (city logistics).

*Industrial and logistics parks* not only fulfil transport functions but are also industrial areas. [Visser et al. 1999]

*Business Grouping Developments* are primarily set up to group businesses. When in such areas also grouping of transshipment, storage and transport activities take place, they operate like a freight platform. [Visser et al. 1999]

*Special logistic areas* such as cargo centres and seaports provide an interface for additional transport modes. [Visser et al. 1999]

Scope of this  
Handbook

The scope of this Handbook is given by the following aspects:

- serving city and conurbation (city orientation)
- distribution (bundling and commissioning)
- storage
- option for intermodality

With regard to the classification of Table 8 this means, that the focus is on urban distribution centres (UDC) and urban oriented freight villages (shaded in grey). The criteria of urban orientation thereby sets the limits of this quite wide focus. A freight platform is defined as urban oriented, when

- a strong physical link exists between the platform and the city
- a significant share of activities on site are dedicated towards city distribution
- specific regulatory aspects have been negotiated to address city distribution practices.

Usually, only UDCs and certain freight platforms show the described characteristics. [REFORM 1999]

### 7.1.3 Aims and benefits

Two main goals

As the different categories of freight centres have shown, their aims can differ according to category, local circumstances, spatial orientation, etc. Nevertheless, there are two main reasons behind the development of freight centres:

- the consolidation of goods flows (collection and distribution centre)
- the facilitation of logistic activities with location, space (e.g. storage) and other facilities (particularly transshipment)

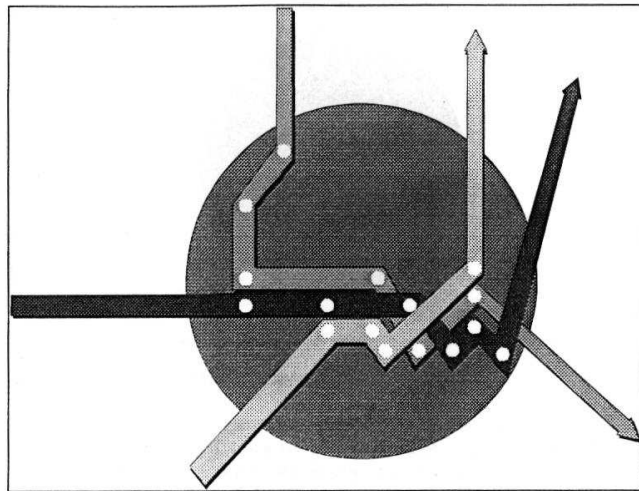
The consolidation of goods flows aims at increasing the efficiency of the collection or distribution process, thereby reducing the environmental impact of urban delivery activities. By bundling various trips of one or several carriers to single trips with better capacity usage or smaller and cleaner vehicles, congestion and noise in the city can be reduced, time gained and delivery made more reliable.<sup>48</sup> In such a co-operation between forwarders

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<sup>48</sup> For the economic costs (basically the necessary additional transshipment) and other hindrances refer to Chapter 7.1.4.



the number of trips can be reduced by a corresponding increase in the load factors. Figure 72 shows typical urban transport patterns that call for realising such synergies: each vehicle serves major parts of the city (some even several cities) within the same route, delivering or collecting only small consignments at each stop.



**Figure 72: Urban transport patterns calling for synergies  
[COW/NTU 1996]**

#### Realising synergies

The facilitation of logistic activities aims at realising synergies by concentrating business activities, whether from one single company or between several companies. Such synergies and business activities can include:

- synergies in logistic processes such as long distance haul, storage (incl. hazardous goods, cooling), packaging, commissioning
- synergies in infrastructure such as connection to transport network, transshipment equipment, environmental investments, railway sidings (economies of scale). Like this, additional services necessary to increase the quality of the intermodal transport and attract new customers can be offered at relatively low cost. By facilitating the implementation of efficient transshipment equipment the freight platforms can support the shift of long distance transport from road to rail
- provision of internal services such as customs, public transport, security services, waste disposal services, information services, training and consulting

- external economies of scale (spillovers) by assembling transport know-how at one single spot
- external supply of logistic activities of shippers, e.g. substitution of (expensive) inner city storage facilities

Public and private  
can benefit both

The REFORM-project distinguishes between public and private aims, showing that freight centres can benefit both: [REFORM 1999, p. 9]

Public benefits:

- Less emissions through more efficient urban deliveries, i.e. a reduction in the number of trips
- Shift of long distance transport from road to rail
- Further traffic reduction in the urban region as trips to service stations can be avoided when these services are provided directly on site
- Stimulation of economic growth in the region (creation of jobs, establishment of new enterprises, improved supply to the industry) by improving the logistic infrastructure

Private benefits (operators and transport companies) are mainly focused on increasing efficiency:

- finding suitable spaces
- bundling consignments
- using intermodal transport
- economic gains from additional services
- participating in co-operations
- attracting new customers

Various  
hindrances in  
the real world

#### 7.1.4 Problems and controversies

Although the idea of distribution and freight centres as outlined above sounds very compelling, particularly the target of increasing the efficiency of urban delivery by consolidating multi-company delivery has proved difficult to meet in the past. Several authors mention different reasons for these failures of urban distribution centres such as: [Wichser/Schäffeler 2001; COST 321 1999; ELTIS]

- Lack of economic interest (interruption of the transport chain at the distribution centre causes additional costs that are not offset by a corresponding gain in efficiency)
- Lack of willingness to co-operate because of fierce competition (fear of disclosing competitive information about order quantities, products, customers, know-how, etc., fear of losing customers to their competitors)
- Reluctance to relinquish control over merchandise and transport chain, particularly the responsibility for the goods transported
- Loss of direct contact between the receiver and the delivering company (the act of delivering offers an opportunity for the transport company to promote itself and to establish a customer relationship - it is the company's "business card")
- Many companies give much higher priority to customer service and competitive advantage than to reduced transport costs
- Reduced need for multi-company consolidation because of the general concentration process in the transport business (for large retail companies with their own distribution network the benefit of multi-company consolidation is rather small).

Another controversy occurs in relation with city logistics projects if urban distribution centres are combined with a heavy lorry ban for the inner city. Although this measure reduces the number of heavy trucks, it will correspondingly multiply the number of small vans which is not really what is best for the environment<sup>49</sup> and the city's inhabitants. [Savy/Dablanc 1995]

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<sup>49</sup> According to UVEK [1998] delivery vans emit 4 times more particles per ton-kilometre than lorries and are almost 5 times as noisy per ton-kilometre.

## 7.2 Related research activities

European research projects

The following European<sup>50</sup> and national research projects related to urban freight platforms have been identified, mainly within the European Union's 4<sup>th</sup> Framework Programme: [CORDIS 2002, BESTUFS 2002]

**REFORM** (Research of freight platforms and freight organisation) aimed at analysing and evaluating the effects of freight platforms regarding the urban traffic and at providing guidelines and criteria for designing, locating and organising freight platforms in urban areas with the view of optimising the benefits of these platforms and to reduce their negative effects. Therefore a database of 96 European freight platforms was created, identifying key characteristics such as transshipment volumes, infrastructure, on-site company interactions and financial arrangements. Test sites included Berlin, Brussels, Madrid and Rome. The focus of the practical application was set on: co-ordination of big interports (long distance traffic) with city terminals (urban and regional traffic); organisational and operational requirements for the development of successful freight platforms; multimodality of freight platforms (road, rail, waterborne traffic).

Project website: <http://www.cordis.lu/transport/src/reform.htm>

**SURFF** (Sustainable urban and regional freight flows) focused on telematics applications in seven EU cities to improve all-round accessibility of information systems within regional freight centres and to support smooth inner urban freight flows. The applications proposed covered operational support both for individual centres and whole networks. City distribution relied on co-ordinated resource management at centres, while inner city freight transport enhanced by interfaces with traffic information services, such as roadside multimedia kiosks for lorry drivers to obtain route guidance or freight documents without needing to access the project sites. Project website: <http://www.euroweb.net/surff>

**LEAN** (Integration of Lean Logistics in urban multimodal transport management to reduce space demand and optimise use of transport mode) aims at developing and demonstrating new concepts to distribute and collect goods in urban areas. The scope include five different levels: 1. Logistics concepts to improve the productivity in transport organisation; 2. City-Terminal operation to improve forwarding processes in view of the whole logistics chain, even with additional goods transfer points and handling costs; 3. Telematics applications, to improve control of goods distribution process; 4. Tools for administrations to influence transport without radical

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<sup>50</sup> Additional information on the EU transport research programme is available at the programme's knowledge centre: <http://europa.eu.int/comm/transport/extra/home.html>

disruption of economic activities; 5. Alternative transport modes recommendations to support significant modal shift to rail. Demonstration sites include Vienna, Linz, Wiener Neustadt; Regensburg, region of Halle/Leipzig/Dessau; Sevilla, Cordoba; Bristol, Norwich.

Project website: <http://www.cordis.lu/transport/src/lean.htm>

**FREIA** (Towards the Networking of European Freight Villages) sought to improve the accessibility of European freight villages and their related networks for transport SMEs. Specific objectives were to identify needs for facilities and information system flows through market surveys, and to provide a web-based guide to European freight villages.

Project website: <http://www.cordis.lu/transport/src/freia.htm>

**IQ** (Intermodal Quality) is aimed at analysing the quality aspects influencing intermodal transport. It will work on the improvement of the interoperability among terminals, interconnectivity and accessibility. The project deals with both the quality of terminals and the quality of network. Demonstration sites: Duisburg (DE), Verona (IT), Madrid (ES) and Barcelona (ES).

Project website: <http://www.cordis.lu/transport/src/iq.htm>

**PLATFORM's** (Computer controlled freight platforms for a time-tabled rail transport system) main objective is to implement a more cost-effective way to manage freight-traffic flows through the enhancement of terminal management and the integration of existing telematic systems. Such an approach is expected to make rail transport competitive for long- and even medium-distance freight transport and thus lead to a substantial reduction of road-based transport. The system for the management of integrated rail-road transport will be developed and tested in some demo terminals available to Consortium industrial members: Rho, Melzo, Rogoredo, Verona, Noisy-le-Sec, Lyon, Valencia, Silla.

Project website: <http://www.cordis.lu/transport/src/platform.htm>

**IDIOMA** (Innovative Distribution with Intermodal Freight Operation in Metropolitan Areas) showed how distribution of goods in metropolitan areas could be improved through several demonstrators including co-ordinated and composite distribution concepts in the Oresund region, co-operative inbound city logistics in Nürnberg, intermodal terminals in Paris, a new concept for linking multiple freight distribution centres and terminals by rail in the Randstad region and various transshipment systems in Zurich.

Project website: <http://www.cordis.lu/transport/src/48343.htm>

Project website: [www.idioma.gr](http://www.idioma.gr)

**FREIGHT VILLAGE 2000** (Quality of Freight Villages Structure and Operations) mainly analyses and evaluates freight village structures and layouts in order to determine whether the proximity of different transport and logistics activities is a key factor for the use of intermodal transport and at establishing the merits and limits of the development of freight villages for the enhancement of intermodal transport competitiveness, based on

benchmarking and analysis of the best practices and case studies. By examining freight village operations and internal organisation the impact of such structures on the environment has been measured and guidelines and management tools have been developed to improve working conditions and security for freight village operators whilst increasing their awareness with regard to risk factors, safety and the environment. Case studies have been made in seven countries in the European Union: Denmark, Finland, France, Germany, Italy, Spain and Sweden.

Project website: <http://www.cordis.lu/transport/src/fv-2000.htm>

**CITY LOGISTICS** (Improvement of urban environmental quality by a City-logistics system with integrated decentralised goods distribution centres as interface between European transport flows) intended to develop a city-logistics concept into which participants in supply and waste disposal took part. The concept could be based on the condition that all participants voluntarily used a software, which had still to be developed during this pilot project: the so-called City-logistics manager. Demonstration site: City of Duisburg (Germany)

**ELCIDIS** (electric vehicle city distribution systems) wants to find a solution for urban logistics by organising urban distribution using quiet and clean (hybrid) electric vehicles, and by a more efficient organisation of urban logistics by a more efficient routing of the vehicles and the use of central distribution centres. Demonstration sites in Rotterdam, Stockholm, La Rochelle, Erlangen, Lombardia and Stavanger.

Project website: [www.elcidis.org](http://www.elcidis.org).

**CITY FREIGHT** (5<sup>th</sup> Framework programme) will analyse the socio-economic and environmental impacts of various changes and measures in urban freight transport and door-to-door delivery, among which Urban Distribution Centres. Project website: [www.cityfreight.org](http://www.cityfreight.org).

National general  
research projects  
on urban freight  
platforms

NFP 41 (**Switzerland**, 1995 - 2001) is a comprehensive National Research Programme on Transport and Environment aiming at an efficient, environment-friendly, socially acceptable transport policy. It consists of over 50 research projects, among which the report B9 "Plates-formes logistiques multimodales et multiservices" deals with urban freight platforms. The study gives an overview and a typology for such platforms, their strategies and their choice of location. It was found that in Switzerland logistics companies are very strongly concentrated at a few locations favourable with regard to transport. Improved co-operation of terminal operators, forwarders, loaders, the Federal Government, Cantons and communities, could provide better solutions with regard to economy, ecology and regional planning. Project website: [www.nfp41.ch](http://www.nfp41.ch)

In **France** the website <http://www.transports-marchandises-en-ville.org/themes/experien.htm> gives a comprehensive overview on French

and European experiences with urban freight platforms.

In **Greece** the Ministry of Transport has recently assigned the “Feasibility Study for the Development of Intermodal Freight Centres along the Hellenic Trans-European Network”. Although its primary aim is rationalisation of the international and inter-regional freight flows (improving the operators’ competitiveness and modal shift from road to intermodal combinations) also these centre’s role in urban freight transport will be assessed. Yet, the study is still in its initial phase. Project website: [www.freightcentres.gr](http://www.freightcentres.gr).

### 7.3 Situation at country level

Fast changing  
information

Material regarding the situation of urban freight platforms in general and of projects related to UFP in different European countries was collected by the various BESTUFS contractors and members. Further input came from the involved experts and the workshop. The following chapters summarise the main findings of the material collection on country and project level. The given information and its assessment represent the situation at the time of collecting the material, i.e. summer 2002.

15 countries  
represented

Material on 15 countries has been collected, covering the whole European Union except Portugal, Ireland, Luxembourg and Finland, plus Switzerland and the overseas countries Australia and Japan (see Figure 121).

A detailed report on each country’s situation concerning urban freight platforms is given in Annex V.

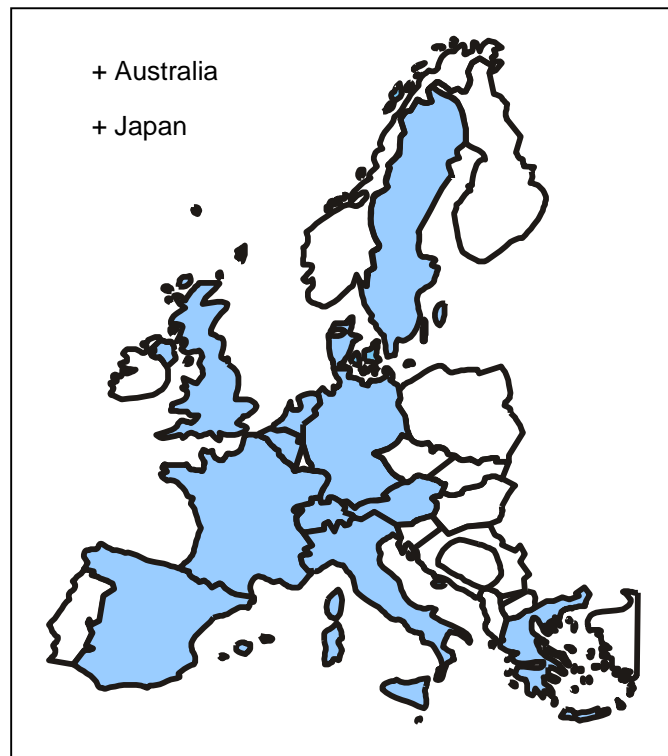


Figure 73: Countries covered by the material collection<sup>51</sup>

### 7.3.1 Importance of urban freight platforms

In order to give a brief impression of the relevance of the topic the BESTUFS members participating in the material collection were asked to estimate the importance (or relevance) of urban freight platforms in their country - in the past, nowadays and in the future. Although the term “importance” is defined rather vaguely and its estimation is always subject to the personal view of the assessor, a rough overview on their different estimations sketches a first picture of the situation concerning urban freight platforms in Europe.<sup>52</sup>

Relevance increa-  
sing again

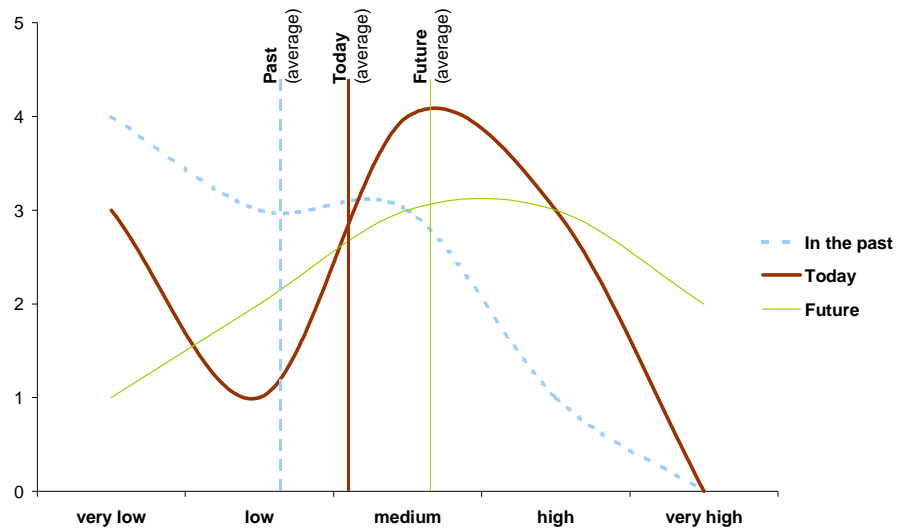
After a period of disillusionment in the late 1990ties when many UFP projects fell short of the high expectations, the importance of Urban Freight

<sup>51</sup> on either country or project level

<sup>52</sup> Please note that the considerations expressed in this chapter represent the personal opinions of the BESTUFS partners participating in the material collection and should not be mistaken as a statistical opinion poll.



Platforms today is considered medium by the average BESTUFS member, although the spread of opinions is quite wide. In any case there is a clear tendency for the general relevance of UFPs to increase in the future, even though not in large hikes (see Figure 122). While a few have closed the chapter UFP or at least stay sceptical after the dampers of the past, others are awaiting a second wave of successful UFPs that have learned from former experiences. By far the most frequent point made for the still increasing relevance of UFPs however are the increasingly severe environmental and transport problems. As a consequence the need for actions in urban freight transport is considered to be growing which will also give a new impetus to urban freight platforms as a possible solution to these problems.



**Figure 74: Past, today's and future importance of UFPs (number of countries)<sup>53</sup>**

<sup>53</sup> According to the personal estimations of the BESTUFS members participating in the material collection

### 7.3.2 National situation regarding urban freight platforms

The concept of freight centres is very different among countries.

Single-company  
platforms

Freight platforms of single transport companies exist in all countries, some more for urban distribution, others rather for regional or national distribution. But while they might be efficient for the companies, they are mostly not from a more global point of view. They usually have to be considered little innovative from a community transport planner's point of view. Therefore - if not mentioned otherwise - we refer exclusively to multi-company platforms in the following when talking about Urban Distribution Centres.

Freight villages

Freight villages are particularly widespread in Germany ("Güterverkehrszentren"), Italy ("Interporti"), France ("plate-formes logistiques") and - to a lesser extent - Belgium. The majority of existing facilities in France, Italy and Germany was established during the 1980s and was developed from existing locations, like industrial sites or rail terminals. Several countries included the development of freight centres in their national policies. Italy was the first in 1990, followed by Germany in 1992 and France in 1993. [Visser et al. 1999] While some of them are very successful they are mostly inter-urban (long-haul) oriented. However, as freight villages are often located in the outskirts of large cities they can also be good candidates for becoming Urban Distribution Centres.



European freight villages are organised in the Europlatforms association, an economic interest group of freight village operators founded in 1991. Today Europlatforms gathers over 40 freight villages, most of which are fully operational. The association has established a common understanding which enabled them to act within a common framework in order to determine and promote the creation of a European network in accordance with EU sponsoring actions aimed at supporting integrated transport and communication networks. After relentless and patient efforts Europlatform today is established as a significant partner for the development of major EU-sponsored projects in the field of information technology applications, quality label on freight centres and intermodal centre network. [[www.freight-village.com/europlat/](http://www.freight-village.com/europlat/)].

Urban Distribution  
Centres

The 90s could be called the boom years of multi-company Urban Distribution Centres. Several European cities set up pilot and demonstration projects for urban distribution platforms in order to co-ordinate the delivery process thereby increasing overall efficiency. These UDCs were in general started or supported by public intervention in one form or another. However, all these projects encountered significant problems (see chapter 7.1.4) which in many

cases led to the end of the project. According to the three leading countries during this UDC boom of the 90s three “models” can be defined [Ministère de l'Équipement 2002]:

The Monaco model

In Monaco, the UDC is owned and operated by the government. In 1989, the government contracted out the operation of freight distribution to a single carrier (a regional transport company). This sub-contractor was given a monopoly over the municipal depot. Added to this was a partial monopoly on the delivery of goods. All trucks over a GVWR of 8 tons (this limit should be lowered to 3.5) are banned from the city of Monte Carlo. If they are to deliver goods to clients there, they have to go to the local freight platform and unload first. The municipal service then takes the final distribution in charge, with specific vehicles. The costs of the service are shared between the municipality, which gives financial aid and free warehouse space to the carrier; the carrier which provides driving and handling staff as well as the vehicles; and finally the retailers who supposedly pay for the amount of goods they receive through the service. [Ministère de l'Équipement 2002]

The Dutch model

Following a national program of energy reduction in cities, many Dutch cities have set up systems of urban freight distribution licenses. Strict operating regulations are imposed on the licensees in exchange for an extended usage of street space and longer delivery hours. Applicant carriers must respect a list of criteria such as good level of truck loading, minimum number of shipments and the use of electric vehicles. This kind of municipal organisation can lead to a quasi monopoly of distribution where a very limited number of registered carriers dominate the market of urban distribution. [Ministère de l'Équipement 2002]

The German model

In the German case, at carriers' own initiative, a private service of goods distribution is set up with the help of the city. Different carriers join together to consolidate freight and distribute it co-operatively. The system might provide additional kinds of services, such as home deliveries, collect and recycle service or short time storage. Government support can take the form of the distribution of an official "City Logistik label" on trucks and warehouses. Governments can also participate in the financing of the system. [Ministère de l'Équipement 2002]

In the following we give a very brief summary on the national situation in the various countries.<sup>54</sup>

Australia:

There has been little interest in multi- or inter-company urban freight platforms in Australia until recently. However, current initiatives by government to promote rail and reduce the impacts of trucks in inner urban areas have led to some new developments.

Austria:

First attempts with urban freight platforms appeared in the mid 90ies but a

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<sup>54</sup> A more detailed report on each country's situation concerning Urban Freight Platforms is given in Annex I.

real success is still missing. A general concept is not recognisable. Most projects follow the trial and error method. The predominant type of urban distribution centre is the private freight platform (single company freight platform for transshipment and consolidation). There is only one freight village in Graz, which is still under construction. Pilot projects like this might indicate a turning point in the issue.

Belgium: There are no multi-company City Distribution Centres such as that of Monaco or La Rochelle in Belgium, although the development of an urban distribution centre for Brussels is under discussion. Until the 1970s, freight distribution was organised on a provincial basis. Each province had a “general freight market” with all types of goods. Due to the evolution in the scale of markets wholesale activities in provincial capitals disappeared. Distribution systems are involving an increasing number of urban areas, and activities formerly located within cities have most often relocated to the outskirts of cities nearby important highway intersections where large freight villages are established.

Denmark: After a concentration process in the 90s Denmark today has 5-6 national and international transport companies, which operate with distribution of parcels and part-loads through single-company freight centres (typically between 5 and 10, some of them with a large number of sub-terminals). Besides the general controversies in relation to multi-company freight centres, the historical background and the concentration on few distribution systems means that there is a very low commercial interest in establishing multi-company freight centres in Danish cities. Nor have any Danish municipalities been interested in participating financially in establishing partly or fully public freight centres.

France: In the outskirts of French cities there are frequent transshipment terminals of single parcel (and other) companies, generally focused on urban clients but devoted to one operator only. Freight villages (called logistic platforms in France) are extremely successful, but mostly used for non urban transport and logistic activities. Multi-company Urban Distribution Centres are considerably less developed. So far, only La Rochelle has opened one in 2001. Other cities are thinking about it, but they wait for the results in La Rochelle. UDC do not appear as the most relevant solution everywhere. There is a strong commitment of SNCF, the national railway company, to try opening a few UDCs using existing central freight train stations in big cities (Toulouse, Paris, Strasbourg, Lille). No project so far has materialised, due to heavy costs. UDCs receive strong opposition from one of the main transport operator professional organisations.

Germany: In the early 80s restructuring in land use planning and a certain enthusiasm establishing innovative logistical structures led to a number of urban freight platform projects (mainly freight villages called “Güterverkehrszentren”) in almost all federal states. However, the planning and implementation process proved long and problematic. Closely related to freight village activities is the

- initiation of city logistics co-operations which started by the end of the 80s. In 1997 between 70 and 100 cities or regions had implemented or had plans for city logistics. Different approaches occurred, some of them using urban distribution centres to consolidate and co-ordinate transport flows of different transport and forwarding companies (see “The German model” above). Although at the start these projects looked promising, a significant number are now brought to an end while some are still operating.
- Greece: In Greece “freight centres” have been discussed since the early 90s but always focussed on the rationalisation of international and inter-regional freight flows. Urban oriented platforms only exist in the form of single company distribution facilities which mainly rely on facility and equipment modernisation rather than on synergies or breakthrough achieved within the companies’ urban distribution process.
- Italy: Urban freight platforms from single private companies represent a relatively old concept. Freight villages (called “Interporto”) are mainly interested by medium-long range freight flows and have an important role in the regional economic development. In many cases (ex. Bologna Freight Village) these freight platforms have been realised not far from the urban areas; therefore they seem to be good candidates for becoming also multi-company urban distribution centres. Such a type of freight platform is not widely used in Italy at the moment, but a number of local authorities are developing specific studies and demonstration projects. Due to particularly favourable conditions (fragmented retail market, leadership in CNG technology) UDCs together with low environmental impact vehicles are expected to be a promising solution in the next few years.
- Netherlands: In the early 1990s the concept of centralised city distribution centres became an issue of growing interest for Dutch municipalities. The approach was completely unsuccessful because hardly any market parties were involved in the planning, which resulted in a very low acceptance. In 1997 a public private partnership between authorities and transport actors in the Netherlands called Platform Stedelijke Distributie (Platform Urban Distribution) was established to co-ordinate projects and disseminate information on urban distribution issues. Successful implementation was achieved in a few cases where commercially operated distribution centres were given an urban distribution “licence” (see “The Dutch model” above). Because freight volumes to most cities are not large enough for urban distribution centres to be financially feasible, regional logistic parks are favoured by governmental and market parties alike.
- Spain: There is no operational multi-company Urban Freight Platform in Spain. However, a consolidated plan for one exists in the city of Malaga (see project E-01).
- Sweden: In Sweden, single company distribution platforms are common since the 50s and today most of them are also connected to the rail network. While urban

oriented freight villages are not common at all, there have been several trials with multi-company distribution centres, but most of them failed. Still, experiences are shared within networks and institutions.

Switzerland:

Without one or two exceptions the concept of freight villages is not known in Switzerland. Single company platforms however are abundant, but mostly distributing on a national or regional rather than on an urban level. Apart from the freight villages in the narrow sense several 'logistic zones' exist, i.e. industrial zones where a number of logistic and/or transport service providers have been grouping together. In the mid 90ties Switzerland followed the German boom in City logistics projects launching 5 pilot projects for multi-company UDCs. None of these projects is operational anymore today, after the demand staid way below what would have been necessary for the project to be profitable. Another multi-company UDC co-funded by the public has been planned in Zurich but still not realised. Despite these deceiving experiences another city logistics project was started in 2000 being the only operational (and promising) example of a multi-company UDC in Switzerland today.

United Kingdom:

For 25 years the subject of multi-company urban distribution centres has been promoted, studied, case studies carried out. However, no public projects had actually been launched. The UK at a governmental, industry and academic level has been somewhat sceptical of the publicly owned and operated multi-company UDC concept. It was felt that continental experience was not transferable to the UK, as industry structure and other relevant conditions differ. However, in the last two years this view has changed somewhat. A consolidation centre was opened by BAA (British Airport Authority) at Heathrow airport in 2001 as part of their environmental strategy to improve air quality and packaging waste management (see project UK - 02). During 2002, a consolidation centre was opened at Meadowhall shopping centre in Sheffield. This is one of the largest shopping centres in the UK. In this scheme participating retailers have their deliveries made to the 50,000 square feet consolidation centre which is located several hundred metres from the shopping centre rather than direct to their shops. The goods can be stored at this facility, pre-retail services performed on them and can then be transported to the shops at the retailers' convenience using a shared delivery system. These schemes represent a new development in logistics and distribution management in the UK. It is not yet clear whether similar schemes will be widely implemented in the UK.

### 7.3.3 Legal framework conditions

Direct influence	In most countries there are a number of legal framework conditions that directly influence the establishment of urban freight platforms.
Restrictions for particular goods	<p>Legal constraints like HACCP and other national laws set particular requirements to the handling facilities and the distribution conditions for unpacked and temperature sensitive goods.</p> <p>Transshipment of high value products is often prohibited by insurance companies.</p>
Urban planning regulations	In some countries (such as Greece, Denmark) it is the general urban planning regulations for industries that regulate the establishment of UFPs too. However, in Sweden there are more restricted land use planning regulations when it comes to traffic disturbance. In Switzerland law states certain technical and spatial requirements for the establishment of transshipment platforms, <sup>55</sup> the locations of existing and possible future industrial areas suitable for logistic platforms are secured by land use plans on a regional level; furthermore a specific study on the environmental impacts is required for new transshipment and distribution centres with more than 20 ha of storage area. <sup>56</sup> In the UK national planning policy guidelines do promote the placement of DCs at the periphery of towns and cities. <sup>57</sup>
Co-funding, Subsidies	In Germany the government assists with the funding of freight villages given that an intermodal interface is built (in parallel to the freight village development). In Switzerland, transshipment terminals for intermodal transport are co-funded by the government (see project CH-01).
Indirect influence	Other legal framework conditions do not apply directly to freight platforms but nevertheless can have a strong influence on their establishment, location, economic viability, etc.
City access restrictions	In all countries many cities apply access restrictions like delivery time windows, vehicle weight limits, lorry bans, etc for the inner city or certain areas (see BESTUFS Best Practice Handbook 1). Obviously, these restrictions can favour Urban Distribution Centres if either they can cope better with these restrictions (e.g. by using appropriate vehicles) or if they are given a special status, i.e. if they are (partly) exempted from the restrictions (the Dutch model). However, granting a special status to one or

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<sup>55</sup> Verordnung über die Umladestatione des kombinierten Verkehrs; Accord général sur le transport combiné

<sup>56</sup> Verordnung über die Umweltverträglichkeitsprüfung (UVPV)

<sup>57</sup> National Planning Policy Guidelines 3, 6 and 9.

several market players is delicate as it might quickly interfere with free market competition (monopoly, oligopoly). As an example, in France general public law requires a good environmental or “public order” reason or a deficiency in the private sector in order to favour one operator over the others.

Pricing incentives

In Switzerland the pre- and end-haulage of intermodal transport is de facto exempted from the Heavy Vehicles Fee (LSVA) within a radius of 40km around the transshipment terminal which can have a strong influence on the location of new freight villages (see project CH-01). Urban road pricing (e.g. a cordon pricing) could also influence the establishment of UDCs if it charges different prices structure for different vehicles types. However, for such an effect prices would need to be higher than those charged today.

#### 7.4 Regarded case studies (project-level)

31 projects collected

32 projects from all participating countries except Denmark and Greece have been collected. Table 12 gives an overview on the collected projects, project’s phase, type of platform, main aims, operator, transport modes integrated, spatial orientation and size of the platform. Short descriptions of all collected projects are given in Annex VI.

Focus on multi-company UDCs

A large majority of the collected projects are multi-company UDCs, i.e. distribution platforms that aim at bundling and consolidating the consignments of different transport operators in order to make use of inter-company synergies (see Figure 75).

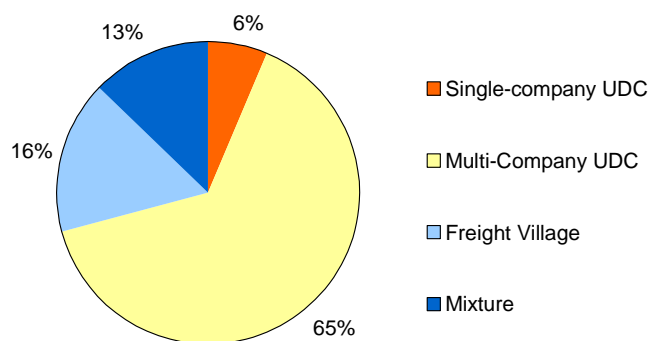


Figure 75: Collected projects according to type of platform



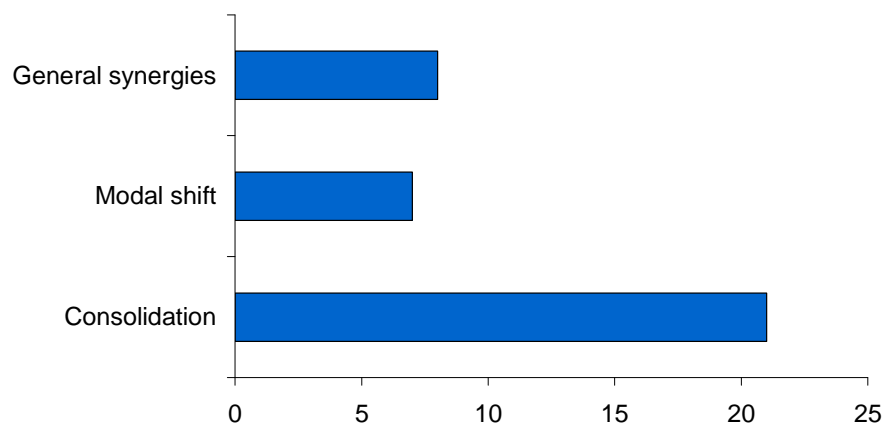
**Table 9: Overview on collected urban freight platform projects** (marked projects are presented in detail)

Country	City/Region	Name of concept	Project Phase	Platform type	Main aims	Platform operator	Transport modes	Orientation	Size [ha]
AT - 01	Graz	Cargo Center Graz	realisation	FV / UDC	Modal shift	PPP organisation	Rail, road	City, regional	50 ha
AT - 02	Graz	Styrialog	planning, design	Multi UDC	general synergies	-	Road, rail	City	< 1 ha
AT - 03	Salzburg	City Logistik Salzburg	planning, design	Multi UDC	Consolidation	-	Road	City	< 1 ha
AUS - 01	Melbourne	Port shuttle service	realisation	Freight village	Modal shift, general synergies	-	Rail, road, sea	City	-
AUS - 02	Melbourne	Austrak	planning, design	Mixture	Consolidation, modal shift	-	Rail, road	City	-
BE - 01	La Louvière	GAROCENTRE	operational	Freight village	General synergies	Organisation of municipalities	Road (rail, river planned)	Regional, national, international	55 ha
BE - 02	Halle (Brussels)	Colruyt centralised storage & distribution centre	operational	Single DC	Consolidation	single wholesaler	Road	national	20 ha
BE - 03	Brussels	Brussels Morning Market MABRU	operational	"Multi USC"	Consolidation	PPP organisation	Road	City	4 ha
BE - 04	Antwerpen	Slachthuisite	realisation	Mixture	General synergies	Private company	Road	City	-
BE - 05	Antwerpen	BPA Groothandelsmarkt	realisation	Mixture	General synergies	Private companies	Road	City, regional	30 ha
CH - 01	Rekingen (Zurich)	LGZ Hochrhein	realisation	Freight village	Modal shift, Consolidation	Private organisation	Rail, road	City, regional	30 ha
CH - 02	Embrach (Zurich)	Embraport	operational	Freight village	General synergies	Private company	Road, rail	City, regional, national	-
CH - 03	Basel	Basel City Logistics	not operational anymore	Multi UDC	Consolidation	PPP organisation	Road (rail)	City centre	n. a.
CH - 04	Thun	SpediThun	operational	Multi UDC	Consolidation	Private transp. comp.	Road (rail)	City	-

Country	City/Region	Name of concept	Project Phase	Platform type	Main aims	Platform operator	Transport modes	Orientation	Size [ha]
CH - 05	Schaffhausen	City Logistik Schaffhausen	abandoned	Multi UDC	Consolidation	Private company	Road, Rail	City centre	-
D - 01	Kassel	City Logistik Kassel	operational	Multi UDC	Consolidation	Private transp. comp.	Road	City centre	-
D - 02	Essen	Stadtlogistik Essen	operational	Multi UDC	Consolidation	Private company	Road	City	-
D - 03	Berlin	Berlin-Brandenburg integrated goods traffic strategy	operational	Freight villages	Consolidation, modal shift	-	Road, rail, inland waterways	City, regional	n. a.
E - 01	Malaga	Calle Camas	planning, design	Multi UDC	general synergies	PPP organisation	Road	City centre	< 1 ha
F - 01	La Rochelle	Plate-forme ELCIDIS	operational	Multi UDC	Consolidation	PPP organisation	Road	City centre	< 1 ha
F - 02	Toulouse	CDU Toulouse-Raynal	realisation	Multi UDC	Consolidation, modal shift	-	Rail, road	City	-
IT - 01	Siena	Siena City Logistics	planning	Multi UDC	Consolidation	PPP organisation	Road	City centre	-
IT - 02	Ferrara	Coopser UDC	operational	Multi UDC	Consolidation	Private co-operation	Road	City	2 ha
JAP - 01	Fukuoka	Tenjin Joint Distribution System	operational	Multi UDC	Consolidation	several private companies	Road	City	n. a.
MO - 01	Monaco	Plate-forme de frêt de Fontvieille	operational	Multi UDC	Consolidation	PPP organisation	Road	City	-
NL - 01	Groningen	Groningen City Logistics	operational	Single UDCs	Consolidation	several private companies	Road	City	n. a.
NL - 02	Leiden	Stadsdistributiecentrum Leiden BV	stopped	Multi UDC	Consolidation	PPP organisation	Road	city centre	-
SE - 01	Stockholm	Stocodist	realisation	Multi UDC	General synergies	several private companies	Road	city	3.5 ha
SE - 02	Stockholm	Hammarby sjöstad	realisation	Multi DC	Consolidation	PPP organisation	Road	Construction site	-
SE - 03	Malmö	City Logistics - co-ordinated distribution	realisation	Multi UDC	consolidation	PPP organisation	Road	district	n. a.
UK - 01	York	Cyclone Couriers	operational	Multi UDC	Consolidation, modal shift	private company	Road (bicycles)	City	-
UK - 02	London	Heathrow Airport	operational	Multi UDC	Consolidation	private company	Road	Airport	0.2 ha

Main objective:  
consolidation

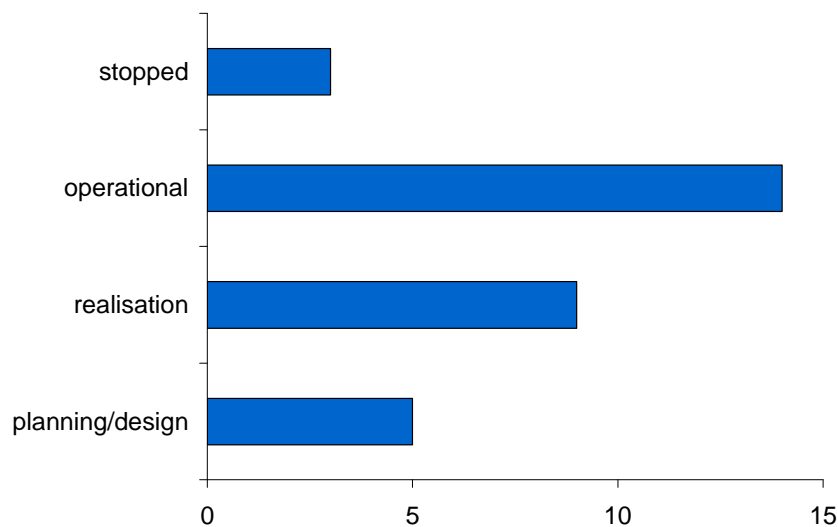
A look at the main objectives of the platforms confirms this picture. Most projects aim at consolidation, while the enhancement of modal shift is only a target for a minority of the projects. Thus, the collected projects are rather about improving the efficiency of urban distribution (for economical and/or ecological reasons) than about shifting transport towards more environmentally friendly modes (see **Fehler! Kein gültiges Resultat für Tabelle.**).



**Figure 76: Collected projects according to their main objective(s)**

Still a lot of activity

About half of the collected projects are operational already, most of the rest are in a planning stage or about to be realised (see Figure 77). This confirms the estimations regarding the relevance of UFPs in the past, today and in the future: On the one hand the substantial number of operational projects shows that Urban Freight Platforms are not a new concept. On the other hand the amount of projects to be realised in the future clearly indicates that - in spite of many backlashes in the 90ties - UFPs are still seen by many people as a possible suitable instrument to tackle the increasing urban freight transport problems.



**Figure 77: Collected projects according to their status**

#### Assessment of the projects

The following project descriptions show examples of planned or implemented urban freight platforms and assess the experiences made. As many innovative projects are planned or set-up, a selection had to be made.

Thereby, the following aspects were considered:

- Relevance for BESTUFS, innovative character and contribution to solve problems
- Success / failure analysis and real world experiences
- Balance among countries and approaches
- Availability of further information
- Coverage by other EU-research projects

Example 7.4.1:  
Kassel

### **Example 7.4.1: City Logistik Kassel (Germany)**

[Huschebeck 2002]

#### **Key words**

**UDC, co-operation for delivery, neutral transport operator, bundling**

#### Background and objectives

The still ongoing project started in 1994. 7 forwarding companies are involved in a co-operation for delivering the inner city of Kassel. One neutral transport operator is employed to carry out the transport operations.

Kassel has about 200'000 inhabitants. It is located in Northern Hessen on the crossing of to the A 7 (North-South Motorway) and A 44 (connection to the Ruhr area). Main industrial activities are: automotive and transport industry, telematics and software development, environmental and energy technology and culture and tourism.

The implementation of an urban distribution centre was an integral part of the city logistics approach in Kassel initiated by the forwarding association and the chamber for industry and commerce Kassel. In the beginning of the project a series of studies were carried out surveying the requirements, volumes and acceptance of a city logistics approach.

#### Basic approach

A neutral city logistics operator delivers the inner city on behalf of the forwarding companies involved. At 6.00 a.m. he starts the collection tour. About 5 vehicles are employed to collect the consignments delivered at the forwarders' depots during the night. At the urban distribution centre the consignments are bundled according to the address of the consignees as well as to specific street corridors. At about 10.00 a.m. the urban delivery starts with two to three 7,5 tons vehicles. Usually two tours are carried out per day (depending on the transport volumes). In average about 5 to 6 tons are to be transported via the urban distribution centre.

#### Information & communication

The city logistics operator receives the transport volumes in the morning via e-mail. The delivery takes place the same day. In case that a delivery cannot take place the city logistics operator informs the respective forwarder (from whom he got the transport order) via telephone. The processes of collection, commissioning, and delivery are not technically supported and are taking place on the basis of receipts.

#### Financial solution

The services from the neutral operator (transport and transshipment) are be paid on the basis of a specific city logistics tariff. The operator is invoicing his services with each forwarder separately. According to statements and surveys carried out the approach shows no significant change on the cost side for the forwarding companies involved (neither benefit nor extra costs

compared to the usual delivery services). No specific institutional measures have been foreseen to support the approach.

Results and experiences

According to studies carried out the urban distribution centre is seen as unavoidable if the goods bound for the city are to be bundled more efficiently which is the main aim of the Kassel city logistics scheme. The consignees in the inner city do not state any differences in service quality compared to the former delivery scheme.

The main success of the scheme is that the transports can be bundled without any extra costs or inconveniences for the involved companies nor the consignees. On the other hand the public benefits from less trips, thus less vehicles and less emissions. The benefits of the involved transport operators and forwarders are intangibles: the image of being an innovative and responsible company.

A success factor in the beginning of the scheme was the motivation of the partners involved. Especially, the drivers of the neutral operator have to fulfil additional service requirements of the consignees.

Plans to extend the approach (e.g. to create a link with the urban freight village) were not further followed.

More information

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Example 7.4.2:  
Fukuoka

### Example 7.4.2: Tenjin Joint Distribution System, Fukuoka (Japan)

[Taniguchi 2002]

#### Key words

**UDC, centralisation of delivery and collection, significant benefits**

#### Background and objectives

A joint distribution system that centralises delivery and collection services started in 1978 in order to alleviate the traffic congestion and improve the environment in Tenjin district of Fukuoka City, Japan. Tenjin district of 370,000 m<sup>2</sup> is the central business area with about 2,200 offices that produce 2 trillion Japanese Yen (approx. 16 billion Euro) of wholesale and retail sale. The limitation of loading/unloading spaces on and off street generated illegal parking, which led to higher levels of congestion.

#### Basic approach

In 1978 twenty-nine freight carriers joined joint delivery systems under the supervision of the Regional Transport Office of Ministry of Transport. In 1994 thirty-six companies have established the Tenjin District Joint Distribution Company Ltd. for promoting the systems. The Tenjin-District Joint Distribution Programme is now being commissioned for delivery and collection services to/from the Tenjin 1st Street ~ 5th Street area.



**Figure 78: Map of Tenjin district and joint distribution centre**  
[Taniguchi 2002]

Freight carriers bring their goods to Hakozaki distribution centre of the Joint Distribution Company that is located in the suburb of Fukuoka City, close to the interchange of urban expressways (see Figure 78). Then the Joint Distribution Company will deliver goods from member carriers to each receiver at Tenjin district after sorting goods to each building. The Joint Distribution Company also collects goods from customers in Tenjin district and unloads them at the distribution centre of the Joint Distribution Company where the freight carriers take them over individually. The Joint Distribution Company delivers about 90,000 parcels and collects about 10,000 parcels per month at Tenjin district.

**Financial solution** Each freight carrier pays 160 Japanese Yen per parcel below 50 kg. No subsidies are provided by the public agencies.

**Institutional solution** The Regional Transport Office of Ministry of Transport supports the joint distribution systems in Tenjin district in institutional ways. The Regional Transport Office provides a platform for discussing related things and co-ordinating many stakeholders including shippers, freight carriers, residents and administration who are involved in the systems.

**Supporting measures** 'Truck only' parking lots are very helpful for truck drivers to easily find loading/unloading space, although they are not dedicated to the Joint Delivery Company.

**Future possibilities** The Regional Transport Office is planning to extend this system to other areas, for example in Kumamoto City.



**Figure 79: Hakozaki Joint Distribution Centre**

**Results and experiences**

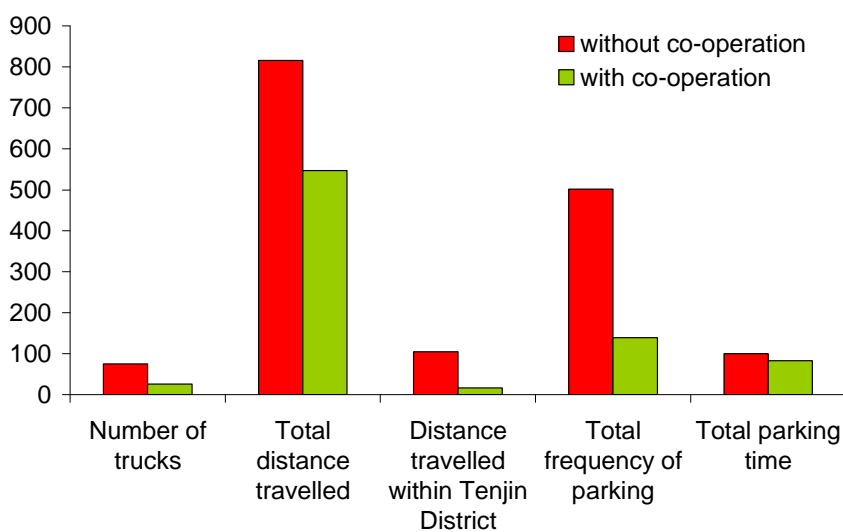
Freight carriers, shippers, road users and residents alike benefit from the joint distribution systems. Ieda et al. (1992) estimated - based on modelling - the benefits of Tenjin-District Joint Distribution Programme as follows:

- decrease of number of trucks in the served area by 65%,



- decrease of total distance travelled (km/day) by 28%,
- decrease of total distance travelled within Tenjin district (km/day) by 87%,
- decrease of total frequency of parking (times/day) by 72%
- decrease of total parking time (h/day) by 17%.

These effects (see Figure 80) will alleviate traffic congestion and improve the environment in Tenjin district.



**Figure 80: Estimated effects of the Tenjin District JDP  
[Ieda et al. 1992 quoted after Taniguchi 2002]**

More information

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Example 7.4.3:  
Leiden (NL)

**Example 7.4.3: Stadsdistributiecentrum Leiden BV (NL)**

[Schoemaker 2002]

**Key words**

**UDC, Urban Distributor status, PPP, failure factors**

**Background**

Leiden is a historical city with 117'000 inhabitants, a city with a road infrastructure dating back to the Middle Ages. Leiden's road structure is not geared to today's traffic volume. Congestion, street hazards, air and noise pollution are the negative effects of this traffic volume which pose a threat to the living environment of the city centre. With a special focus on protecting the quality of the living environment, the Municipality of Leiden has taken several measures to force back the number of cars in the city centre, among others the restriction of the shop supply hours from 6.00 to 11.00 a.m.. Based on the wish to facilitate a constant supply to the city centre, the thought arose that a city distribution centre (that is allowed to deliver outside the time-frame) would be an attractive alternative for transport companies that were unable to deliver within the restricted supply hours or that did not want to drive into the crowded city centre anymore. Shopkeepers and other entrepreneurs in the city centre would also be able to profit from a city distribution centre by moving their storage elsewhere and having their goods delivered on call. The advantages of a city distribution centre (CDC) are:

- less commercial traffic in the city
- the goods are transported to and from the city in environmentally friendly (electric) vehicles, geared to the size of the city centre streets
- transport companies can deliver their goods at the edge of town, which makes them gain time.

In February 1994 the Municipality of Leiden decided that there should be a city distribution centre and that further measures should be taken to reduce the traffic volume in the city centre. The city distribution centre opened its doors in 1997.

**Objectives**

The city distribution centre was expected to provide:

- a daily reduction of the number of commercial vehicles from 24,000 to 5,000 (-80% !)
- a sharp reduction in pollution (smell, air, noise) in the city centre
- improved accessibility of the city centre
- improved road safety

- an example for other, similar cities in the Netherlands and Europe.

#### Basic approach

The CDC Leiden had 5 electric Spijkstaal 2050 vans. The propulsion (electrical) and the size are in line with the regulations laid down by the Municipality for city distribution. The range of the vehicle is about 80 kilometres. The maximum speed is 25 km/h. The vans have been built specifically for supply services in city centres. They are relatively small and virtually noiseless. They are clean, as there are no exhaust fumes or smuts.

The major working area of the CDC was to be the city centre of Leiden. Since this area did not provide enough customers, the working area was soon expanded to the whole of Leiden and the city's surroundings.

Opposition of citizens' organisations (from the residential area bordering the location) and changes in the zoning plan were the reasons why the original location at the Willem van der Madeweg in the Roomburg area (next to the A4 motorway) became impossible. The new location was an extension of existing facilities of Van de Bogerd, the company that also operated the CDC.



**Figure 81: The fleet of electric vehicles of the Leiden CDC**

#### Institutional approach

The project started with a public private partnership of the Municipality of Leiden and Hom Consultancy. Later Rien van den Bogerd Beheer BV, the owner of Mosterd Transport Leiden BV and De Zijlbedrijven Holding BV, a

municipal organisation providing employment within a re-employment scheme for the disabled and the long-term unemployed, joined the partnership. All three parties had an equal share in the partnership. They also issued an interest-free loan to the partnership. The Municipality of Leiden provided loans to facilitate the actual start and the operation of the CDC.

The number of shareholders of the city distribution centre remained below expectation. "Stadsdistributiecentrum Leiden BV" had always welcomed other transport companies to become shareholders. During the preliminary research stage there were contacts with Van Gend en Loos, PTT, Van Duuren Nederlandse Pakket Dienst and others. However, none of these organisations were sufficiently interested in becoming a shareholder of the CDC. Their reasons were:

- the necessity did/does not exist yet, as the traffic regulations in Leiden's city centre are still offering sufficient space for supply services;
- the unwillingness to collaborate with the "competitor" for fear of losing their own customers.

Supporting  
measures

After the CDC had started a traffic measure was announced, which implied that supply hours in the closed area would only be until 10.00 a.m. instead of 11.00 a.m. This measure was widely protested against, not only by the interest groups, but also by shopkeepers and other receivers of goods. The interest groups accused the Municipality of making regulations with the mere objective of keeping the city distribution centre alive. The discussions resulted in the city centre being off-limits for vehicles over 7.5 tons.

Recognition of the  
CDC

The original recognition procedure for city distribution centres (which grants them the special right to deliver outside the given time-windows) was made for one city distribution centre that was open to more shareholders. Both the stipulations concerning location of the city distribution centre and the criteria determining the necessary number of shipments excluded, in fact, any other distribution platform than the one support by the Municipality from being recognised as official CDC.

The recognition procedure, as it was laid down eventually in the spring of 1998, was quite different, because of the following reasons:

- the city distribution centre was in fact located in Leiderdorp, so not on the territory of Leiden, nor was it any longer right next to the A4 motorway.
- the city distribution centre largely failed to reach by far the ambitious number of shipments that had been targeted in the business plan.
- the interest groups said they would not accept a monopoly position of

the Municipality-supported City distribution centre and insisted that other companies in the market should be able to be recognised.

So far 3 other transport companies, next to the city distribution centre that was supported by the Municipality, have successfully applied for recognition.

Results and experiences

The project could not fulfil its expectations and has been stopped in 2000.

The table below shows what has been the average number of shipments per week in 1997 until week 6 of 2000.

Year	Leiden City Centre	Rest of Leiden	Outside Leiden	Total
1997	44	142	73	259
1998	81	142	171	394
1999	103	134	154	391
2000 (until week 6)	130	167	126	423

**Table 10: Average number of shipments per week of the CDC**

Insufficient performance

The regulations for city distribution centres stipulate that a recognised city distribution centre must, at the end of the first year of recognition, deliver or collect 100 shipments average per working day (i.e. 500 per week !) in the city centre. The figures show that the CDC does by far not meet this requirement. At best 26 addresses in the city centre were visited.

From a business point of view, the performance of the CDC was insufficient. The break-even point was to be reached at a number of 600 shipments per day. As shown in the table above, even the weekly averages do not get close to this figure. Here it must be added that the break-even point of the CDC is relatively low, as it is using subsidised labour, provided by De Zijlbedrijven. If salaries had been paid in accordance with Collective Labour Agreement, the break-even point would have been at 2,000 shipments per day.

Negligible effect on traffic volumes

The project had a negligible effect on traffic volumes. When we compare the volumes of incoming truck traffic in the city centre of Leiden of September 1996 and October 1999, there is hardly any difference. A slight rise in truck traffic has been detected (5,590 incoming vehicles in 1996 against 5,757 in 1999). After the service area was expanded to different parts of the city, the vehicles had to mix with faster traffic on high speed roads, which led to hindrance and delays for other traffic.

The electric vehicles

The project had a negligible impact on environmental issues. The vehicles though, are considered to be a good alternative in the city centre because of

though, are considered to be a good alternative in the city centre because of the low fuel consumption, emissions and noise level. Outside the inner city, the low maximum speed (25 km/h) and limited range (80 km) make it an unsuitable alternative. As for maintenance and fuel costs, the vans are excellent. There is no exhaust and they are almost noiseless. There is even a bell on them to warn other road users. If final transport in the city centre were the only task, the vans would be very well suitable.

#### Failure factors

The deceiving result of the CDC Leiden is explained as follows:

- **The location of the CDC** in Leiderdorp was too far away from the motorway from Amsterdam to The Hague (A4).
- **The reluctance in the transport industry** to tranship goods bound for the city centre:
  - The transport industry in the Netherlands is an extremely competitive one. The margins are extraordinarily thin. The transport companies believe that transshipment involves extra costs, risks and delays in delivery. The time gained by not having to drive into the city centre is outweighed by the extra costs.
  - If the CDC were only intended for goods bound for the city centre, that would be insufficient for transport companies willing to tranship their goods. They would also like to get rid of the goods with regional destinations. (As a matter of fact, the CDC solved this problem quite soon by also serving the region around Leiden).
  - For some logistic service providers the personal contact with the customer is an important argument for not transshipping the goods.
  - For particular goods (mainly refrigerated and frozen goods) transshipment is not allowed or only on very strict conditions because of legal restrictions.
  - When valuable goods are involved, insurance companies do not allow transshipment or changes in transport modalities.
  - In those cases where goods have already been pooled for the city centre (e.g. with the companies that received recognition in the past year) there was no need to bring the goods to the municipality-supported city distribution centre.
- The **opposition against the supporting traffic measures** to be introduced by the Municipality

The transport companies and other interest groups accused the Municipality of introducing traffic measures in order to keep the Municipality-supported City distribution centre alive and not in order to keep the city attractive and economically healthy.

- **The image of the CDC**

The image of the CDC has not been a positive one. City centre residents applauded the concept, but entrepreneurs and potential users found their reluctance confirmed when it appeared that the electric vans of the CDC slowed traffic on the main roads down and when it became clear that the Municipality had to provide (a lot of) extra money for the city distribution centre.

- **The arrival of new competing city distribution centres**

Because the recognition procedure for city distribution centres had been opened up, existing transport companies could also apply for recognition as city distribution centre.



**Figure 82: Electric van distributing in Leiden, Netherlands**

#### Conclusions

City distribution services are of vital importance to shops, companies, institutions and building sites in the city centre. If the old city centres wish to remain economically vital, city distribution is a necessity. This requires creative solutions in which the governing principle would have to be that non-essential traffic is kept out and essential traffic is facilitated.

The electric vans used by the city distribution centre are only suitable for transport in the restricted traffic city centre zone. They were too slow for transport from the city distribution centre to the city centre or vice versa.

A distribution centre that focuses on distributing goods exclusively to the city centre is financially not feasible. The working area should be larger.

Society must be willing to support the (traffic) measures taken by the Municipality and these measures should, of course, be enforceable. In particular the rule that vehicles over 7.5 tonnes are banned appears more difficult to enforce than expected. For the local police this rule does not have priority at present.

Although the project, which was supported by the Municipality, has now been terminated, the issue of city distribution is still a prominent item on the agenda. The lesson that Leiden has learned is that one side cannot impose the solution to the supply issue. Together with the parties involved, improvements must be sought. This road has now been taken.

More information

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Example 7.4.4:  
Stockholm

#### Example 7.4.4: Hammarby Sjöstad, Stockholm (Sweden)

[Brisvall 2002]

#### Key words

**Centralised construction site delivery, damage & theft safe storage, smart traffic control, PPP**

#### Background and objectives

Hammarby Sjöstad is Sweden's largest housing project in the heart of Stockholm. An old dockland and industrial area is being transformed into a modern city area that will form a logical extension of Södermalm, with 8'000 apartments housing a population of 20,000. After completion of all parts of the project in 2010 there will be 30,000 people living and working in the area. On the construction site of 200 ha 800 apartments are built per year with 150 additional persons moving in each month. 700 tons of material are delivered to the construction site each day (average of 1.5 tons per delivery). In peak hours there is one delivery every 30 seconds.



Figure 83: The Hammarby Sjöstad logistic centre (HSLC) [Brisvall 2002]

Basic approach

To solve this logistic challenge a logistic centre has been established where all inbound goods are consolidated and stored. Services are the bundled transportation of material, temporary storage of material and smart traffic control for vehicles entering the construction yard (including SMS-based variable smart traffic signs). The advantages are that the goods are not being damaged (e.g. by weather conditions) or being stolen. Furthermore, the deliveries are being done efficient and effective by means of a central planning tool, where constructors can indicate if a road is blocked. This results in a better living and working environment and saves money.

Institutional and financial solution

The project is supported by all 10 contractors of the housing project (no free riding), the investors and the City of Stockholm which currently pays about 50% of the costs (yet it is planned that the future operators will pay more after they have seen and experienced the benefits). However, the question whether the project is profitable seen from a total costs perspective remains open.



Figure 84: Truck guidance by smart traffic signs [Brisvall 2002]

Future possibilities

Due to its connection with the construction site the logistics centre is a temporary project.

Results and  
experiences

A future evaluation of the project will have to show if the benefits such as efficient distribution, better environment and less damages will outweigh the costs of the project in an overall perspective.



**Figure 85: Inside the Hammarby Sjöstad logistic centre [Brisvall 2002]**

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Example 7.4.5:  
York (UK)

### Example 7.4.5: Cyclone Couriers, York (UK)

[Zunder 2002]

#### Key words

**UDC, centralised parcel distribution by bike, zero emission, private initiative**

#### Background

Cyclone couriers is a private company with contracts with circa 40 parcel carriers. Cyclone couriers fills a commercial gap as York is a congested medieval city with a vehicle ban from 11 a.m. to 4 a.m. Cyclone couriers operate a next day delivery service on behalf of their contracted parcel carrier customers.

#### Basic approach

They tranship from carrier's vehicles or collect. They consolidate and deliver the next day. This is only possible for a cycle due to the vehicle bans and even before the ban the cycles are faster, use bike lanes and are cheaper. The cycles are similar to cycle rickshaws but built for freight. The tricycles feature 42 speed transmission, hydraulic disc brakes and aircraft grade steel and accommodate loads up to 250kg. Cargo boxes and passenger seats can be swapped in minutes.



Figure 86: A Rickshaw of the 21<sup>st</sup> century [www.cyclesmaximus.uk]



Cyclone couriers also run collect and deliver courier services both within York and from carriers to York. With this they use normal bikes, thus avoiding loading/unloading restrictions as well as using bike lanes, being faster in congested traffic and cheaper.

Financial solution

Cyclone couriers is financed by the clients (parcel carriers and others) paying for the service.



Results and experiences

Since a bike and rider costs £60 a day as opposed to £250 a day for a van and driver, it is cheaper to use bikes to achieve multiple delivery slots than the equivalent number of vans

More information

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Example 7.4.6:  
Graz

### Example 7.4.6: Cargo Center Graz CCG (Austria)

[Dorner 2002a; Dorner 2002b; CCG 2002]

#### Key words

**Freight village, transshipment terminal, integrated UDC, PPP**

#### Background and objectives

The Cargo Center Graz (CCG) is a freight village with additional urban distribution functions. The Styrian government together with the chamber of commerce initiated the project in 1997. The platform should start operations in 2003.

Graz is a turntable for international transport connecting Northern and Central Europe with Italy and Eastern Europe. Graz (400.000 inhabitants) is probably the most important and fastest growing economic area in Austria, especially enforced by automotive and high-tech industry. Like any other city in Austria Graz has traffic problems in the centre and at the main connections. Although different individual freight centres are already operating (including the RCA, Rail Cargo Austria, with intermodal deliveries within Austria), space for multi-company urban distribution centres and efficient facilities for intermodal transport, especially a transshipment terminal, are lacking. It is the aim of the CCG to shift transports from road to rail, especially the transports of the automotive industry.



Figure 87: Location within the national and regional network  
[Dorner 2002a]

Basic approach

The freight village is located 12 km outside the city centre of Graz to the south where many of the automotive companies are situated (see Figure 87). The facility is being newly built in the open countryside. The urban distribution centre (see project AT-02: Styrialog), which will be integrated into the freight village, will mainly serve the city of Graz and the surrounding areas. From the CCG there is direct connection to the motorway and railway system (see Figure 88). The Airport Graz-Thalerhof is 4 km away, the Airport Business Center is located within 2 km.



**Figure 88: CCG with direct connection to motorway and railway  
[CCG 2002]**

The Cargo Center Graz will offer the following services:

- **Unaccompanied Rail Transport** with containers, craneable semitrailers and swap bodies
- **Rolling Highway (ROLA)**
- **Carload Transport:**
  - Carloads in block trains
  - Groups of freight cars or individual freight cars
  - Shuttle trains
  - Special trains for the automotive industry
  - Traction co-operations with other rail customers
- **Rental of equipment and space:**
  - Rental of transshipment areas and halls
  - Rental of uncovered areas for the loading of automobiles
  - Storage of containers and swap bodies

-Rental of craneable containers, swap bodies and craneable semitrailers

- **Services:**

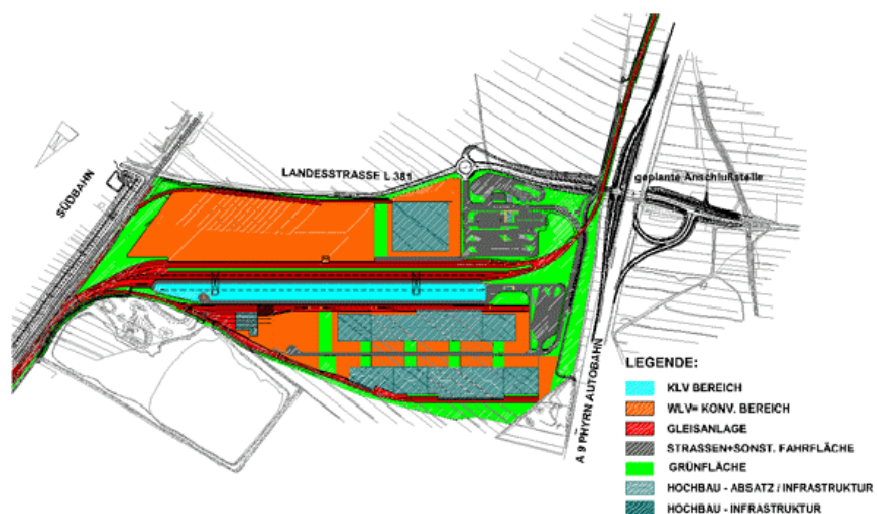
- Development of logistic solutions for individual clients and branches
- City-logistics (Styrialog) and regional logistics
- Setup of a communication and information platform (e-logistics)
- Training and instruction-center for special subjects

- **Service facilities:**

- Customs office
- Container depot
- Support base and service facilities for locomotives and freight cars
- Maintenance of transport vehicles and containers
- Filling station and washing bays
- Restaurant and catering

Technical solution

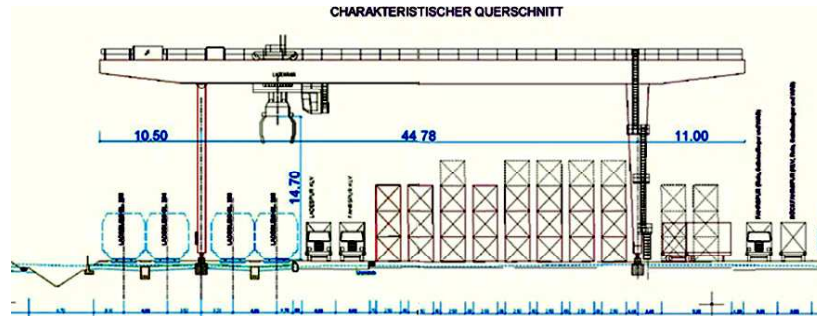
The CCG has a transshipment terminal for intermodal transport. The whole facility will cover an area of 500.000m<sup>2</sup>, whereof 75.000 m<sup>2</sup> covered transshipment area and 100.000 m<sup>2</sup> open transshipment area. The rest are storage (warehouses) and office buildings (see Figure 89). Any type of freight which is usually transported on road and rail (containers, parcels, ...) will be processed. Companies on site include carrier and forwarding agencies, ÖBB (the Austrian federal railway system), logistic service providers (especially the operator of the urban distribution centre), service providers (IT-support, repair and cleaning facilities, ...) and customs clearance.





**Figure 89: Map of the CCG area [Dorner 2002b]**

Two cranes are installed for transshipment (see Figure 90). At the beginning the facility will handle around 36.000 lifts a year, whereas the maximum capacity is at 100'000 lifts. For 2030 around 95.000 lifts are forecasted to be carried out at the transshipment terminal.



**Figure 90: Two cranes for transshipment [Dorner 2002a]**

Institutional and financial solution

The project is realised as a Private Public Partnership (PPP), involving private carrier and forwarding agencies, the three largest banks of Styria and the Styrian Energy Supplier. The province of Styria and the Federal Government are not directly in the partnership, but helped to finance the project. The operating company is the Cargo Center Graz - CCG KG, which is owned by private carrier and forwarding agencies (51%), the energy service provider ESTAG (25,1%), and the three largest banks of Styria (23,9%). The terminal is financed by the Schieneninfrastrukturgesellschaft SCHIG and built by the Hochleistungs-Strecken AG, both state-owned companies. The SCHIG will lease the facility to the CCG KG for a duration of 30 years, who will then become the owner.

Investment costs are about 130 Mill EUR. 80 Mill EUR are covered by federal financing (SCHIG), 50 Mill EUR by private investors. The users will be charged for logistic services.

Supporting measures

The local authorities including the provincial administration supported the project with respect to zoning and legal procedures. The province of Styria supported the foundation of a co-operation called Styrialog which will establish an urban distribution centre (UDC) within the Cargo Center (see project AT-02).



**Figure 91: Entrance gate and warehouses of the CCG [Dorner 2002b]**

Results and experiences

As far as the project has proceeded it seems that the PPP-model works pretty well. The project is on time.

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Example 7.4.7:  
Rekingen (Zurich)

**Example 7.4.7: LGZ Hochrhein, Rekingen (Zurich, Switzerland)**

[Züst 2002; Strub 2002]

**Key words**

**Freight village, transformation of former cement plant, transshipment terminal, legal incentives for sustainable solutions**

**Background and objectives**

The logistics platform and freight village LGZ Hochrhein (Logistik und Güterverkehrszentrum Hochrhein) is currently taking up operation. The container terminal (consisting of transshipment infrastructure and short-term storage place) being one of its key elements is planned to be implemented in November 2003.

The logistic centre is realised on the premises of a former cement plant that has been shut down about 3 years ago which was a backlash for the economy of the region (jobs, supply of small enterprises). It is expected that the implementation of the logistic centre in Rekingen will improve the economic situation in the region. Due to the special framework conditions (see below: use of existing facilities, location, LSVA) the project is regarded as a viable business opportunity.

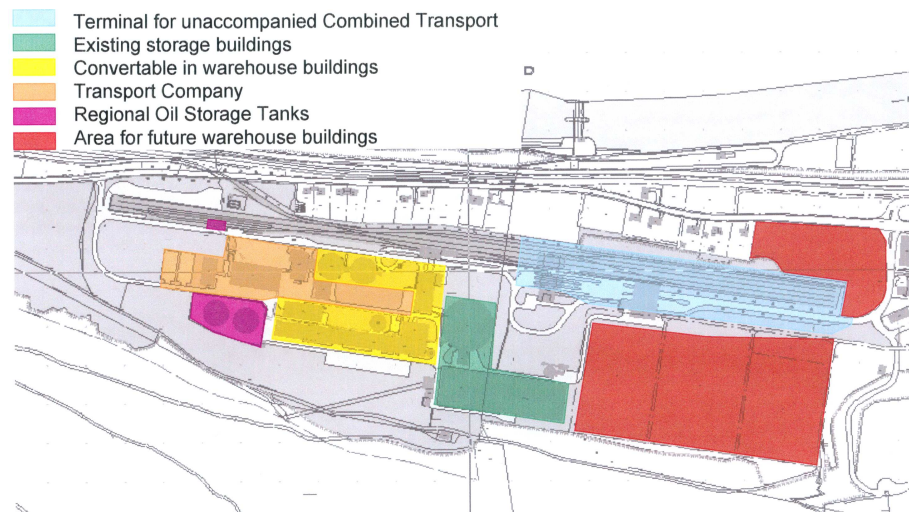
**Basic approach**

The logistic centre is situated in Rekingen which lies within a range of around 40 km to the cities of Zurich, Winterthur and Baden, a triangle forming the strongest economic region of Switzerland. It is well located with respect to the local traffic situation as it enables to reach Zurich from the North where traffic jams are less frequent than from the main access in the West.

Enhancing modal shift being one of its main objectives, the logistic centre will be supplied as well by rail as by road. Shuttle trains bring containers from Basel (waterway transport on the Rhine), western Switzerland or Germany to the container terminal. The regional distribution particularly to the conurbation of Zurich, will be carried out by trucks. A possible consolidation of various containers for improving delivery efficiency might be done in the logistic centre. As the cement plant was rather transport intensive already, the necessary road and rail infrastructure is given.

The size of the whole Logistic Centre in Rekingen is around 30ha. Essential parts of the existing infrastructure from the former cement production plant can be used for the Logistic Centre, for instance the existing sewage system and many buildings (see Figure 92).

Transshipment in the container terminal is done by a crane. The demand for intermodal transport is estimated between 45'000 and 65'000 TEU/year.



**Figure 92: Planned segmentation of the platform [Züst 2002]**

Institutional and  
financial solution

The LGZ Hochrhein is a private initiative of a group of local entrepreneurs who want to realise a logistic centre on the premises of a former cement production plant. The feasibility study for the whole project and the planning of the transshipment terminal was done by a private consulting company (RAPP AG).

The whole freight village will be managed by the LGZ AG who rents the area to private companies. The container terminal which is open to every paying customer will be operated by a consortium of several private and semi-private companies. The Federal Railway Company will be a partner.

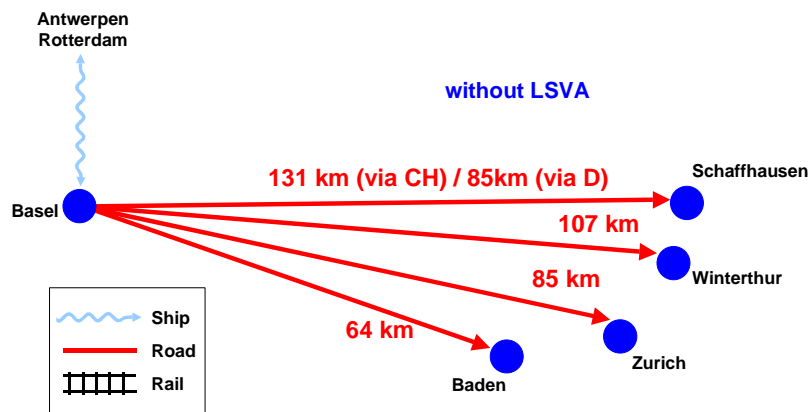
The logistic centre is a private initiative. However, the transshipment terminal is strongly supported by the government whose stated policy is to support modal shift from road to rail. Around 70% of the investment costs for the container terminal will be paid by the Swiss government. More than half of those 70% is à fond perdu, the rest has to be paid back (at a preferential interest rate). This direct and indirect subsidisation is directly linked to the amount of lorry equivalents transferred from road to rail by the operation of the container terminal (The more lorries shifted from road to rail, the higher the subsidies) !

Special framework  
conditions

The new logistic centre of Rekingen is taking advantage of the distance-related heavy vehicle fee (LSVA) implemented in Switzerland in the beginning of 2001 which makes intermodal transport more attractive. Heavy goods vehicles are charged LSVA on all roads in Switzerland. Vehicles in unaccompanied combined transport though get 20 or 25 CHF per container or semitrailer reimbursed, an amount that equals a pre- or end-haulage

distance of around 40 km. Therefore the location of Rekingen in a range of less than 40 km to the centres of Zurich, Winterthur and Baden is very attractive, as the road leg from/to Zurich is de facto exempted from the LSVA which makes combined transport a viable alternative to road only transport. Figure 93 shows the impact of the LSVA on the mode of transport.

without LSVA



with LSVA

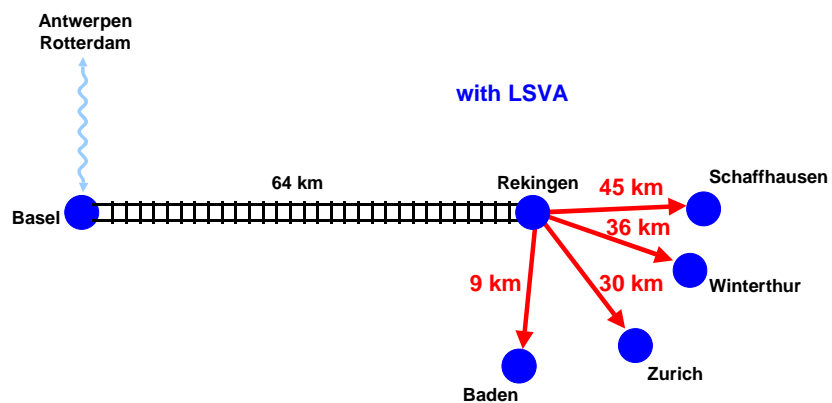


Figure 93: Impact of the LSVA on the mode of transport [Züst 2002]

Results and experiences

As the project is just about to be realised it is too early for an evaluation of experiences. The project however shows how legal framework conditions (the LSVA in this case) can influence the decisions of private economic actors towards environmentally friendly and socially desirable solutions.

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Example 7.4.8:  
Heathrow (London)

### **Example 7.4.8: Heathrow Airport Consolidation Centre (London, UK)**

[Allen 2002, Energy Efficiency Programme 2002, BAA 2002]

#### **Key words**

**Retail consolidation centre, air quality, reduction in vehicle movements**

#### **Background and objectives**

Retail development within Heathrow airport has increased dramatically over the past ten years, but the infrastructure has seen little change to accommodate this growth. The delivery operation across Terminals 1-4 had evolved over several years and was no longer adequate to support the growing retail business at Heathrow. Particular problems included:

- An overloaded central terminal area and single tunnel access;
- Poor infrastructure;
- A lengthy and unpredictable delivery service.

Congestion, both on airport roads and at loading bays, was a significant problem with 439 supplier movements to 240 retail outlets being made each day.



**Figure 94: Congestion at Heathrow terminal 3 delivery point [BAA 2002]**

These issues, together with growing environmental pressures and the potential requirements of Terminal 5, demanded a radical re-think of the previous operation. The planned new Terminal 5 is expected to add another 450,000 sq ft of retailing space within the airport, which is approximately equivalent to 250 new retail units. If Terminal 5 were to operate on a similar basis to that used previously at Terminals 1-4, it would require 64 new delivery bays plus a substantial parking area. A lack of space in the

proposed site for Terminal 5 prevents this from being a viable option.

A study of truck movements at Heathrow was carried out. Various proposals were produced as to how the number of vehicle movements supplying retail units at Terminals 1-4 could be reduced. The study evaluated various retail delivery options and reviewed both the planned infrastructure and new methods of approaching the delivery problem. It was decided that the best combination of traffic volume, physical infrastructure requirements and delivery/handling costs would be met by the creation of a consolidation centre.

Basic approach

The study recommended that this consolidation centre be located away from the airport and that all retail merchandise and catering foodstuffs be delivered to it. The only exceptions to this would be newspaper deliveries and high value, high insurance cost deliveries such as cash / bullion. These items should be transferred into the airport directly by their suppliers. This option would also provide balanced benefits to all parties that use, or are affected by, the airport, i.e. retailers, airlines, flight service companies, passengers and the local community.

Institutional solution

BAA then sought to develop an alliance with a key logistics operator in order to manage the supply of goods to the retail outlets in the airport. This partnership had four main aims:

- To improve methods of delivery to retail units;
- To reduce vehicle movements through consolidation of products;
- To improve handling at delivery point both on and off the airport;
- To improve management of packaging waste.

The consolidation centre is managed by the logistics provider Exel on behalf of the British Airport Authority BAA. BAA plc is the largest commercial operator of airports in the world. It owns and operates seven UK airports, which together handle over 100 million passengers each year. In addition to airport management, the company's core skills include retailing, project management and property management and development.

Exel performed a trial of this off-airport consolidation method between March and June 2000, with eight retailers that operated a total of 40 retail outlets across the four terminals. The trial produced a 66% reduction in deliveries to the airport and good feedback from the retailers. Exel was awarded a five-year contract worth 3 million Euro per year to operate the consolidation centre. Operations started in May 2001.

Technical and operational solution

Exel currently operate a 25,000 square ft warehouse at Hatton Cross with five vehicles (4 x 17 tonne rigid box-vans with tail-lifts and 1 x 3.5 tonne with



tail-lift) and some 20 operational and clerical staff. Freight arrives at the centre in a variety of packaging from the suppliers. It is subject to security checks, caged and sealed ready for despatch. The seal is part of a DfT approved security arrangement that includes a Rapiscan X-ray machine, operated by trained Exel staff. The vehicles used to deliver goods from the consolidation centre to the airport initially on hire to Exel were replaced by a new company owned fleet in summer 2002. This consists of three tractor units and three urban rear-steer 11 metre box van trailers, with tail-lifts. Two trailers are dual compartment, with a moving bulkhead, and fitted with electric fridge motors to cater for chilled / frozen food deliveries from the cold store.

When the Exel vehicle unloads at the delivery bay within the airport, an Exel employee brings the goods to the store (or stockroom) in a roll-cage together with delivery notes from both the supplier and Exel. Any stock that needs to be transferred between branches within the airport can be labelled with the new delivery address and will be delivered on the next visit to the named branch. A driver and usually two terminal staff man operate each delivery vehicle, which remains at a terminal until deliveries to all the retail outlets are completed. Security checking procedures have been embedded into the system at the consolidation centre, reducing the number of checks that need to be made for vehicles destined airside. All the delivery and terminal staff are screened for security.



**Figure 95: Thermo container and roll-cage inside Heathrow Airport  
[BAA 2002]**

Deliveries can be scheduled to suit the retailers' preference. The consolidation centre is now open 24 hours a day, 7 days a week for deliveries and also provides onward transportation and delivery to the airport at any time specified by the retailer. Exel also collect and remove recyclable packaging waste, such as cardboard and plastic. The delivery staff are trained to ensure that they are aware of the environmental role that they can play.

Future  
development and

Exel are currently introducing a computerised hand-held tracking system, based on Palm Pilot technology, which uses software specifically written by

possibilities

Exel for the BAA operation. Every carton will be given a bar-coded label, as will every cage so that goods will be scanned in and out of the consolidation centre. Load planning will be performed electronically, producing a full manifest by cage. Each cage will be sealed and tracked as it moves around the airport and will also be scanned at retail outlets. This development will increase the efficiency of this delivery operation still further.

It is planned that the staff responsible for delivering goods into the retail units will be based full-time within the terminals and will not travel with the delivery vehicle. Deliveries will then be made to a dedicated area within each terminal, where the full cages are off-loaded and then the empty cages and cages containing waste packaging are loaded onto the vehicle. A turnaround time of 20 minutes per vehicle at each terminal is expected. These vehicles would contain 15 cages, with each retail outlet receiving 2/3 cages per delivery. This operation will significantly reduce the time taken to deliver to each retail outlet.

All new concessionaire agreements and renegotiated existing agreements at Heathrow will require retailers to use the Exel facility, so that by the end of 2004 all retailers will be incorporated within the system as existing franchises are renewed.

There will also be a study of the possible efficiencies of supply chains both within and between other BAA owned airports. The consolidation centre currently services Gatwick Airport three times a week, and London City and Stansted Airports. BAA is keen to examine how other airport operations in UK could benefit from the use of a consolidation centre in their distribution operations.

Results and experiences

The approach is proving to be extremely effective and won the prestigious Institute of Logistics and Transport Environmental Award 2001. It has gained increasing acceptance as the retailers serviced by the consolidation centre see the benefits for their organisations. There are some 240 retail units currently trading across Terminals 1-4 and Exel's consolidation centre operation currently services 100 of these. The target was for Exel to service 10% of the total expected volume within the scheme by the end of Year 1, but this target was achieved within six months.

In summary, Heathrow's new consolidation centre has achieved:

- A reduction in the number of vehicles travelling to the terminals, thereby reducing congestion both within the airport and on the approach roads. These improved traffic flows within the airport benefit all airport users both in terms of reduced congestion and improved air quality.
- A reduction in the number of vehicles passing through control points and driving airside, thus reducing the number of less experienced drivers on these airport roads. Flight operations (e.g. aircraft refuelling, baggage

handling, flight catering) have been greatly enhanced by this reduction in congestion.

- Faster deliveries being made to the consolidation centre by suppliers since there is less congestion on approach roads and fewer delays in off-loading goods and loading returns.
- More frequent and scheduled deliveries to the terminal buildings, enabling retailers to know more accurately when goods will arrive, within agreed delivery periods. This helps a retailer to receive merchandise in a shorter time, something that is greatly appreciated.
- Potential savings in both supply chain and staffing costs for retailers using the consolidation centre.



**Figure 96: Exel vehicle airside at Heathrow [BAA 2002]**

#### Economic benefits

In the last week of January 2002 there were 115 inbound deliveries to the consolidation centre, each with an average turn around time of 12 minutes. The total time that suppliers' vehicles spent at the consolidation centre that week was 115 deliveries x 12 minutes = 23 hours. Previously suppliers' vehicles would have made up to four deliveries to the airport (i.e. one to each terminal). Each of these would take approximately 45 minutes to complete. Assuming that a single vehicle would have made an average of three deliveries to the airport, the total time taken by suppliers vehicles to deliver to the airport before the establishment of the consolidation centre would have been 115 deliveries x 3 drops x 45 minutes = 258.75 hours. This also assumes that there would have been the same number of weekly deliveries by suppliers as in 2002.

This corresponds to a saving of 235.75 hours per week, which translates to a

Environmental benefits	<p>cost saving of around 7'000 Euro, assuming a 30 Euro per hour rate to cover the fixed costs of the vehicles involved. Annually this equates to a saving in excess of 370'000 Euro, based on current levels of activity.</p> <p>Annually, 22.15 tonnes of Carbon Dioxide are currently being saved which is equal to the Carbon Dioxide generated by a family car over 123,067 km or 7,692 x 10 mile journeys. This reduction in journeys also saves 1.35 kg of Carbon Monoxide, 1.06 kg of NMVOC (Non Methane Volatile Organic Compounds), 3.79 kg of Nitrogen Oxide and 0.28 kg of Particulates a week. Since these savings were calculated at current business levels with the consolidation centre serving only 40% of potential outlets, they are likely to be increased further in the future. Emissions are also expected to reduce when the new alternative-fuelled fleet is introduced. The intention is to use compressed natural gas fuelled vehicles, as they provide the best current improvement to local air quality.</p>
Summary	<p>The project has been very successful so far, and it is planned to include all retailers operating within Heathrow by 2004. The partnership between BAA and Exel contributes to the environmental strategy for Heathrow by identifying base data, measuring, monitoring and setting targets to demonstrate the improvement in air quality and packaging waste management – as well as service levels and ease of access. Heathrow airport has seen a significant reduction in the number of vehicle movements as a result of this scheme. On time delivery performance to the retail outlets is currently 95%. BAA have been able to set targets at full implementation of a 75% reduction in the number of vehicles delivering to the airport and a 90% use of vehicle load capacity.</p> <p>Retailers operating within the airport receive more effective, on-time deliveries on high security shared-user vehicles. The project has been so successful that any new retailer uses the consolidation centre as a condition of contract. With such positive commercial and environmental benefits, this type of solution may be adopted not only by other airports but also by retailing operations with similar congestion problems such as those based in city centre locations.</p>
More information	<p>Member of BESTUFS who did the material collection: Julien Allen, University of Westminster</p> <p>This information has been taken from Heathrow Airport Retail Consolidation Centre, Good Practice Case Study No.402 published by the Energy Efficiency Best Practice Programme in May 2002. The full case study is available on the Energy Efficiency Best Practice Programme website at: <a href="http://www.energy-efficiency.gov.uk/document/gpcs/GPCS402.pdf">http://www.energy-efficiency.gov.uk/document/gpcs/GPCS402.pdf</a></p>

## 7.5 Synthesis from the case studies

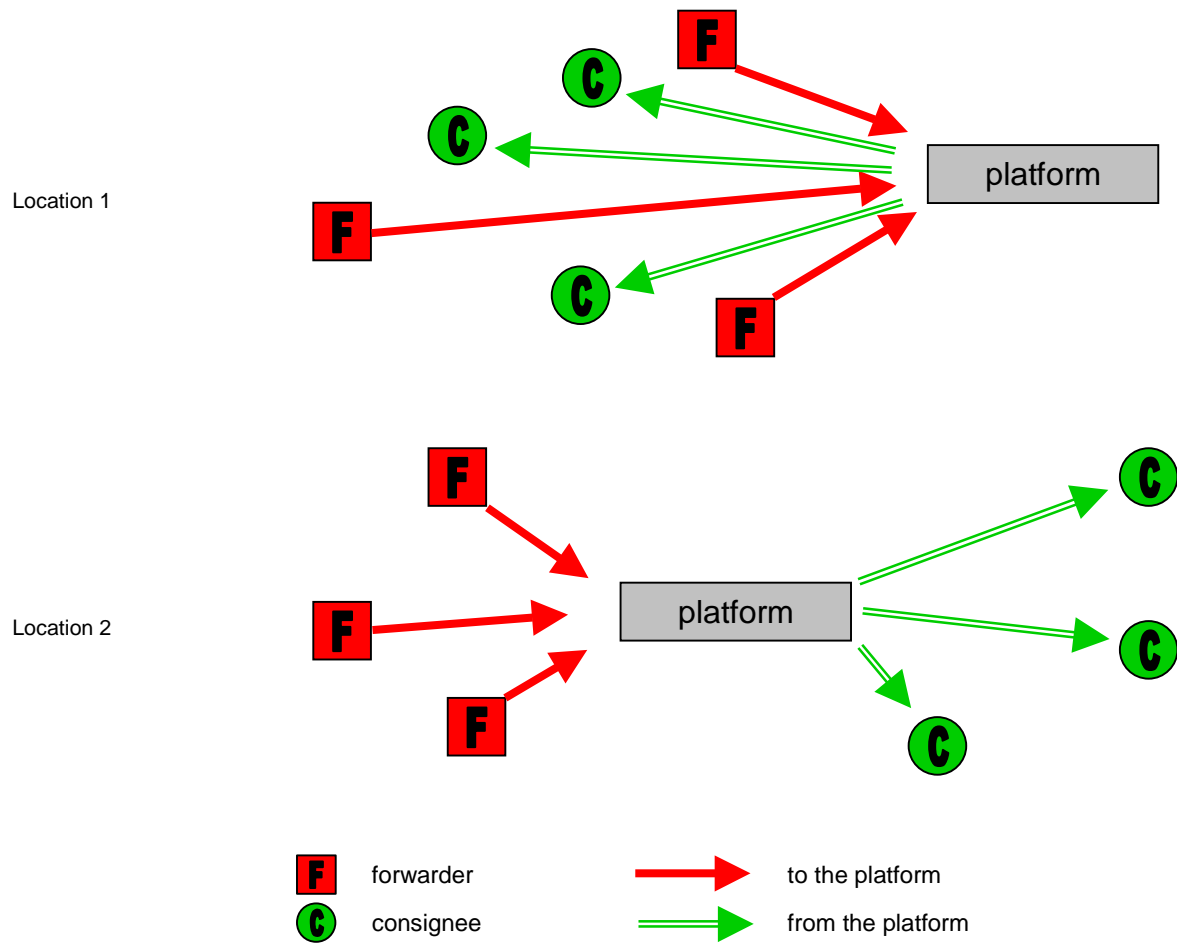
Among the projects collected and studied two main categories of freight platforms can be distinguished: (Multi-company) UDCs and Freight Villages. Although they pursue rather different objectives and dispose of rather different characteristics some common aspects can be stated.

### Location

For both Distribution Platforms as for freight villages the location of the platform is one of the key factors for success. Being a turntable for goods transports an excellent connection to a (multi-modal) transport network is indispensable.

The location also has a substantial influence on the traffic generated by the platform (as illustrated in Figure 97), and thus on its environmental performance. Choosing a smart location consequently involves a certain know-how about the main goods flows delivered and collected to and from the platform.

Land prices and concentrated local emissions through traffic attracted by the platform make it even more difficult to find a suitable location. In order to reduce the roadside distribution transport mileage the platform would preferably be located close to the city and its commercial centres (short distribution legs, longer rail leg in intermodal transport). On the other hand a central location usually involves high land prices and conflicts with the neighbouring residential areas that are sensitive to the traffic attracted by the platform. Due to the high land costs establishing a freight platform in the city centre will generally only be possible when public areas are provided or subsidies are obtained. Because of the traffic involved a location in the outskirts is often preferred or even legally stipulated anyway (e.g. in the UK). In any case areas suitable for a future freight platform should be identified early enough and secured by land use planning measures.



**Figure 97: Location of a freight platform and traffic generated [Baumgarten et al. 1996]**

**Involvement & PPP**

A clear point made by many projects, successful or failing ones, UDCs or freight villages, is the involvement of all parties, public and private ones. It is one of the main conclusions from over a decade of experience with UDCs in the Netherlands that durable solutions cannot be imposed by one side, but that improvement must be sought together with all players involved (see Annex VI, projects NL-01, NL-02). Also in Thun (CH-04) the success of the (small-scale) project is explained by the fact that the project is embedded in a larger partnership between private actors and authorities (see also project AT-01).

**Degree of public intervention**

The degree of public intervention varies from one city to another. Projects range from an entirely private initiative (e.g. project CH-02), based on optional participation and the assumption that operators will be rational

enough to co-operate, to a local authority initiative quite coercive (e.g. project NL-02) and often based on a “distribution licence” with strong incentives attached to it (extended delivery schedules for example). Particularly the latter might imply the risk of monopoly (one carrier being given exclusivity for inner city distribution) or the risk of over-regulation (in Monaco the government is planning to ban all trucks above 3.5 tons and to create a “goods control squad”). All this multiplies the number of small vans which is not really what is best for the environment. [Savy/Dablanc 1995]

Attractive freight villages

A freight village can only be established successfully when private companies can be attracted to the platform. Therefore, the sustainable profitability associated to operating within a freight platform has to be proved to private companies. This profitability for transport companies can result from a variety of impacts: [REFORM 1999]

- suitable spaces with efficient transport infrastructure
- efficiently used combined transport
- location nearby other transport companies in order to facilitate co-operation
- benefits from additional services provided directly on site
- benefits when distances to customers are reduced.

When a large amount of transport operators and industries are established on the platform the service sector (logistics, customs, restaurants, post office, hotels) will, naturally, be drawn to site.

... with public support

Freight villages (and also UDCs) are often organised as Public Private Partnerships. Public support for freight villages is justified by the freight village pursuing twofold public aims, an economical and an ecological one:

- freight villages increase the region's competitiveness and may help to attract industry (see e.g. Annex VI, project CH-01)
- intermodal freight villages promote modal shift reducing long distance road transport (see projects CH-01, D-03, AT-01)

Operating a transshipment terminal for modal shift is only profitable when a large freight volume is transhipped. At freight platforms this volume can be expected when: [REFORM 1999]

- the region of the platform is widely integrated into the national and international market
- a high regional freight volume with a strong affinity to freight platforms exists
- the platform is directly linked to a main railway route
- a large number of forwarders are established on site

In order to boost regional economy industrial companies have to be attracted. The decision of industries to locate at a platform depends on a variety of factors such as:

- availability of land
- land price
- availability and cost of educated/specialised labour
- distance to the sales areas

Public support of freight villages can take various forms, such as providing land at low costs, securing of appropriate areas, direct subsidies, etc. They can even be linked directly to the degree at which the public objectives are met (see project CH-01).

Requirements for successful freight villages

Given the mentioned requirements the implementation of freight villages and logistics areas to strengthen the competitiveness of the railway and to attract new industries to the region will only be successful when: [REFORM 1999]

- strong economic links to other European regions exist
- the platform is directly connected to the international rail and road infrastructure network

This strengthens again the importance of the location of the freight village as it has been pointed out by the case studies (AT-01, BE-01, CH-01, CH-02).

UDCs: benefits...

From the case studies it has become clear that the transport industry, the public and the consignee alike can benefit from Urban Distribution Centres:

- For the transport economy a specialised city distribution offers efficiency benefits as for the average transport operator distribution is less profitable (or not profitable at all) than long distance haul.<sup>58</sup> Furthermore they benefit from co-operation agreements and other on-site services (synergies).
- The public (residents, inhabitants) benefit from a reduction of delivery traffic achieved by better bundling and higher load factors resulting in less noise and air emissions.
- Finally, the consignees benefit from bundled deliveries and from shopping streets more attractive to customers.

... and costs

On the other hand UDCs also impose costs, particularly on the involved transport companies, but also e.g. on the residents in the areas surrounding the platform (increased traffic):

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<sup>58</sup> According to a survey in Düsseldorf [IVM 1995] only 16% of the companies generate profits in the distribution while 40% indicate that distribution causes them financial losses.



- Every transshipment increases transport costs substantially (according to REFORM [1999] 1/3 of distribution costs are caused by transshipment)
- Transaction costs include information exchange but also fear of losing competitive advantages and contact to the final customer etc.

Profitability and  
subsidies

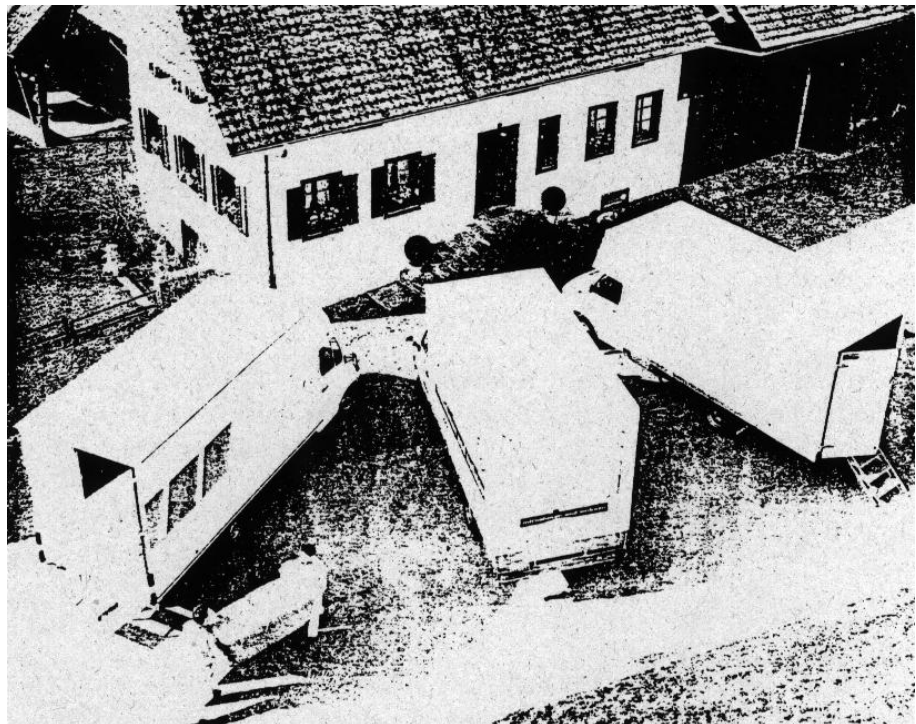
There is no clear answer to the question whether the mentioned benefits outweigh the costs. To complicate things, those who benefit are not necessarily those who bear the costs. An answer would probably be case dependant anyway. The public benefits for instance are depending on values and on local framework conditions (in La Rochelle low emissions in the medieval town centre are an asset for tourism). Among the regarded case studies there are both profitable UDCs and others depending on public subsidies. In either case it seems important that those who benefit also pay for the costs. UDCs can (and have to!) generate added value. If the UDC creates substantial benefits for the public, it should also be actively supported by the public. This can be either by providing permanent subsidies, by active participation (co-ordination, promotion, initial financing), by establishing supportive legal framework conditions such as a lorry ban in the city centre or by supportive operational measures such as an extension of access time windows or the utilisation of reserved roadspace and parking/loading space for the transport companies participating in the scheme. The latter explains why UDCs are often mentioned in connection with access regulations (e.g. projects NL-02, CH-03, etc.). In general it can be stated that UDCs should preferably be integrated into general mobility planning.

Telematics / IT

Although communication obviously is an key element of co-operation, the supporting technologies such as IT and telematics are not very common yet. Here some potential to overcome the difficulties of UDCs has been identified, as the key to co-ordination of channel flows is information sharing among channel members.

Minimum size ?

In Leiden (project NL-02) the break-even point for the UDC was calculated to be at around 2000 shipments per day (or 600 shipments per day with subsidised labour respectively). Although these figures might differ from case to case, they clearly show that a certain volume is needed for a UDC to be profitable. In Leiden it was even found that the inner city alone would be too small an area to generate the necessary volume. On the other hand the UDC in Thun (project CH-04) is running without public subsidies on a very low scale (average delivery of around 50 tons per month in 2001). Obviously the way of calculating costs and benefits can differ (see below).



**Figure 98: Efficient delivery ? [Newspaper ad, Tagesanzeiger 24.3.1994)**

The operating company

The motivation of the partners involved is often mentioned as key element for success (see projects D-01, CH-04). A successful UDC requires innovative entrepreneurs who also take into account the intangible and long-term benefits and consider their engagement as investment into the future. Long-term advantages for the operating company include

- image gains (innovative and responsible company)
- possibility to pro-actively shape the future market conditions
- enlargement of market shares
- comparative advantage against competitors

USP: Local know-how

The know-how of the local conditions, transport network, obstacles (construction sites), delivery conditions (ramps etc.) and excellent local contacts form an important part of the Unique Selling Position of the UDC as urban distributor for other transport operators (see project CH-04).

The consignees

Many forwarders deliver the retailers “for free”, i.e. the transport costs are included (hidden) in the product price. For own-account transport, last mile delivery costs are often not even known. If the distribution chains are switched to a UDC system and the last mile delivery is made by the UDC

operator (for a certain fee per shipment) the deliver costs get transparent and the forwarders might seize the occasion and try to pass on these costs to the retailers. Those are obviously not amused. Although they also benefit from the new scheme (more bundled deliveries, more attractive shopping streets), they even complain about more inconveniences, for instance more complicated communication paths in case of problems and complaints. Therefore retailers are not seldom the main opponents against UDCs (e.g. project CH-05). This once again emphasises the importance of bringing together all stakeholders (from large transport operators to retailers and even pedestrians) right from the beginning (see project CH-04).

UDCs and freight  
villages: synergies

Last but not least: one of the most promising approaches seems to be the combination of UDCs and freight villages in a synergetic way (see e.g. projects D-03, AT-01).

## 7.6 Conclusions and recommendations

### 7.6.1 Conclusions

Different types of freight platforms can be found across Europe:

Common  
Distribution  
Platforms

**Distribution Platforms of single companies** for improving the efficiency of the company's distribution process by exploiting intra-company synergies are widespread and common in all countries. However, in accordance with current logistic trends they are increasingly laid out for regional or national distribution rather than urban distribution. They are often sub-optimal from the public's point of view as they only optimise intra-company processes. Intra-*corporate* platforms, i.e. platforms that are shared between different companies of large corporations or holdings, can be seen as an intermediate form between single company and inter-company platforms (shared by independent companies).

Freight village:  
successful

**Freight villages** are large (usually multimodal) platforms established to make use of inter-company synergies and preferably to increase the competitiveness of intermodal transport. Many are successfully operating in a number of countries (particularly Germany: "Güterverkehrszentren"<sup>59</sup>, Italy: "Interporti" and France: "plate-formes logistiques"), while others are struggling due to unsuitable location or for other reasons. Generally, freight villages operate rather on a regional or national than on an urban level. In a very promising approach they might be connected to or combined with a UDC to form an urban distribution network.

UDC: Relaunch ?

**Urban distribution centres** of / for several companies are implemented for improving the efficiency of urban distribution and for reducing urban truck traffic. The 90s saw a boom of new UDC projects mainly in Central Europe. Since then, many of these projects have been abandoned due to significant problems (see below). Today, the situation is quite heterogeneous among European countries. While some countries have completely closed the chapter or at least stay very sceptical after the disillusioning experiences (UK, Denmark, Belgium, Greece) others are awaiting a second wave of successful UDCs that have learned from the failures of the past. Given that growing environmental and transport problems will increase the need for action it seems well probable that UDCs will be increasingly discussed again as one possible solution.

Influence of

In most countries there are a number of legal framework conditions that

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<sup>59</sup> E.g. Cologne, Hamburg, Munich

legislation

directly restrict or support urban freight platforms. Although legislation does set certain constraints to the establishment of UFPs, there are generally no legal requirements which unnecessarily prevent their establishment. Restricting legislation includes:

- urban planning regulations (location, emissions, etc.)
- restrictions for particular goods (bundling, insurance)

Supporting legislation includes:

- governmental (co-)funding
- city access regulations favouring UFPs
- road pricing favouring intermodal transport and transport bundling

Main barriers for UDCs

In spite of these promising findings, experience to date has shown just as many failing projects as successful ones, particularly among the UDCs. Main barriers for transport operators to participate in UDC schemes proved to be:

- Increase in transshipment raising costs, risks and delays
- Fear of losing competitive advantages and contact to customer
- Fear of new dependencies
- Large initiations and co-ordination efforts
- Difficulties in splitting costs, jobs and responsibilities

Often mentioned was the lack of support by public authorities. As a UDC also improves the general situation of urban traffic for the benefit of everybody, the public should also be prepared to support the project. This does not necessarily have to be through financial subsidies but can as well be through the establishment of supportive legal framework conditions.

Also local retailers were reluctant to new delivery schemes involving UDCs.

Success factors

The following factors that offer potential (not a guarantee as obviously the final success of a project is case dependant) for a successful implementation of a UDC have been identified :

- **PPP:** As outlined above, barriers extend among all parties involved, transport industry, retailers and community alike. Therefore at least an informal partnership bringing together all stakeholders at one table is a key factor for a successful and sustainable solution.
- **Technology (telematics / IT):** Co-ordination, i.e. information sharing among partners, being a core element of any UDC, information technology offers a high potential for increased efficiency that has been rarely used so far.

- **Networks** (integration of different systems): One of the most promising approaches seems to be the combination of UDC and freight village in a synergetic way, thereby forming an urban distribution network.
- **Local know-how:** The know-how of the local conditions, transport network, obstacles (construction sites), delivery conditions (ramps etc.) and excellent local contacts form an important part of the Unique Selling Position of the UDC.
- **Location:** Consolidation and distribution costs depend heavily on the location of the platform. Therefore the location of a freight platform is crucial for its success. Land use planning is necessary to secure the most suitable areas.
- **Intermodal access:** Taking into account the increasing capacity problems on the road networks of today's conurbations, rail can play an important role for efficient access to an urban freight platform. New developments for low cost transshipment equipment offer new opportunities with regards to transshipment of intermodal transport units.
- **Share of own-account transport:** Generally own-account transport offers more potential for bundling among companies, whereas professional transport operators already do bundle goods from different shippers. Thus, the higher the share of own-account transport in the city, the higher the success potential for a UDC.

### 7.6.2 Recommendations

REFORM  
Handbook

The suitability of a certain approach and the selection of the ideal platform depends highly on the specific goals of implementing the freight platform and on the local/regional characteristics. Because many local authorities and operators have requested an evaluation scheme to address these questions, REFORM [1999] has developed a handbook that "gives local authorities and transport oriented companies a guideline for establishing freight platforms, taking into account the specific demands of the different actors involved in the planning and operation process."

Recommendations  
on project / city  
level

Although one of the main insights from the assessed projects is that a unique solution, to be directly transferred in different cities does not exist as each city has its peculiarities, the following recommendations on project level can be given:

- Urban Distribution Centres can contribute to solve urban freight

problems. However, they are just one among many tools. In order to see if they are of use, a community needs to identify what problems or opportunities it has, and then consider a UDC only as one of several possible options.

- An in-depth knowledge of the urban mobility system (offer, demand, logistics chain organisation, stakeholders, etc.) is necessary for understanding what kind of UDC can be realised
- Different tools, regulations etc. must be attentively applied together and harmonised in order to identify “integrated solutions”
- Once the solution identified, it must be implemented step by step, trying to generate consensus among retailers, transport and logistics operators, citizens.
- The system must be open to new participants at any time (no monopoly or oligopoly)
- Vehicle usage and efficiency can be increased even more by additional activities like collecting mail, reverse logistics, etc.
- An integrated approach taking into account access regulations, PPP, vehicle technology etc. is generally more promising.

Role of local authorities

Opinions diverge on the role of local authorities in the process of implementing an urban freight platform. While some projects concluded that “the government has to support the project in the initial phase as well as during operation” (project CH-03), others suggest that “it may not be best for a city government to do more than suggest collocation of 3PL operators and allow the free market to adjudicate who co-operates with whom” [BESTUFS 2002b]. The solution probably must be established on a case by case basis as also suggested by the LEAN and REFORM research projects.

Many city authorities have only limited understanding of the freight transport systems which is a complex system of actors and decisions. Therefore it is very delicate if city authorities try to impose a solution to the market players as it was confirmed by the experiences from the past. However, this does not mean that there is no need for action of local authorities. Together with LEAN and REFORM we would like to encourage cities to:

Facilitating

- give active support to promoting the co-operation between market actors that is essential in establishing city logistic solutions and providing multi-modal hubs for freight transfer. The setting-up of regular stakeholder meetings is one aspect of this. Thereby city authorities can act as a sort of facilitator or catalyst for sustainable solutions. A shift from individually optimal solutions to socially optimal solutions requires the involvement of all actors concerned.

Land use planning

- identify suitable sites at an early stage and secure them by appropriate

	land use planning measures
Shaping framework conditions	<ul style="list-style-type: none"><li>• shape the framework conditions of the transport market by appropriate regulations that internalise external effects and ideally make the individual decisions of the competing actors converge in a socially optimal solution. If urban freight transport is found to impose external costs on society, road pricing measures favouring combined transport or city access regulations favouring the highly occupied low-emission vehicles of a UDC is not a interference with free market but rather the establishment of “fair and efficient”<sup>60</sup> market conditions.</li></ul>
Providing infrastructure	<ul style="list-style-type: none"><li>• provide the necessary transport infrastructure in order to guarantee the platform efficient access to the multimodal transport network (e.g. rail and intermodal access).</li></ul>
Policy-based encouragement	<ul style="list-style-type: none"><li>• eventually provide direct financial support, e.g. a start-up grant for the establishment of bi-modal transshipment terminals. The use of low-emission vehicles is also likely to need some policy-based encouragement. Whether society is prepared to pay for the environmental benefits it receives from a UDC (by subsidising it) or whether all costs are imposed on the market players (by establishing the necessary legal framework conditions) is a political question that in the end depends on the actual distribution of power.</li></ul>
Role of national policy	Single urban freight platforms enable the transition between local economy and international goods flows. On the national level, important goods flows and integration into the European networks are important stakes. The concerted action of the different stakeholders - hauliers, logistic service providers, clients, cities, regional and national authorities - is necessary in order to elaborate a clear strategy for the integration of the different planning activities on all levels concerning freight platforms.
Knowledge gaps	Open questions such as profitability and success factors of urban freight platforms are very much dependent on local framework conditions as well as many of the identified success factors like PPP tradition, communication culture, personal commitment, innovative players etc. Therefore the transferability of research work is rather limited. Consequently the questions to be answered are less analytical questions but rather focused on the need for more empirical experiences.
Research recommendations	Therefore we recommend new demonstrators rather than analytical research projects in order to gain heterogeneous and widespread experience. However, the final benefit of a demonstrator project heavily depends on its

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<sup>60</sup> see the European Commission’s Green paper on “Fair and efficient pricing in Transport” (1995)



evaluation. Therefore a first step might be a in-depth analysis of existing and even former pilots, demonstration projects and experiences (e.g. D-01, D-02, CH-04, JAP-01). Often these projects are independent or provided with very little financial means and have therefore no funds for the necessary evaluation.

In the worst cases lack of evaluation means that even the benefits are disputed, in others the success is measured or obvious but the underlying reasons (success factors) are still unknown. Yet, only success factors would allow to multiply the success and the benefits. Therefore new research projects should:

- include demonstrators of UFPs for more empirical evidence
- evaluate in depth existing and new UFP (pilot) projects
- establish benchmarks for UFPs according to their type and local framework conditions (identifying criteria and benchmark levels)
- deepen the understanding of the interdependence between UFPs, access regulations, PPP and telematics applications.

In the long-term UFPs can only be successful if benefits can be generated for all participating partners: social benefits for the public ones, economical benefits for the private ones. Further practice analysis should therefore focus on the conversion of social/political targets into economical values.

One reason for the identified lack of knowledge is that the success factors of UFPs are rather intangibles (as outlined above) and therefore less accessible to quantitative research methods (usually preferred by transport engineers). Therefore more qualitative methods and “softer” research is needed, e.g. about how to promote innovations or about the successful establishment of Public Private Partnerships that proved such a key issue for urban freight platforms. Accordingly the next BESTUFS Best Practice Handbook will cover Public Private Partnerships. Although BESTUFS cannot provide new research, the Handbook will collect practice and experience and thereby identify starting points for further research.

## 8 Intelligent Transport Systems (ITS)

### 8.1 Introduction

Why ITS ?

It is recognised that sustainable freight transport is the new objective to be achieved as environmental issues play an increasingly dominant role in the overall development process. In particular, life in urban areas is becoming significantly affected by heavily congested roads, so that now innovative transport solutions and concepts are required to properly handle city logistics. City logistics encompasses all the measures needed for environmental friendly and efficient supply of goods to retailers in the city, and the removal of waste. As freight centres will play an important role within this area, city logistics solutions will have to be integrated with the existing and emerging networks of freight centres and the facilities they offer. ITS technologies can be used for the automatic identification of the goods and automatically dispatch to the right lorry for delivery in time to the correct consignee.

As information technologies and advances in electronics continue to revolutionise all aspects of our modern-day world, from our homes and offices to our schools and even our recreation, they are also being applied to our transportation system. These technologies include the latest in computers, electronics, communications and safety systems. Modern telematics application (ITS – Intelligent Transport System) are influencing all areas of transport.

Contribution to an  
environmental  
future ?

Transport telematics provides intelligent technical solutions for coping with high traffic volumes by connecting and interlinking the modes of transport more closely and thus making noticeably better use of the advantages especially of environment-friendly means of transport, for example by the formation of environmentally compatible transport and transport chains. Transport telematics can be seen as one condition for the realisation of an integrated transport system in which all transport modes can be linked more efficient. About that it can contribute to maximise the advantages of environmental transport modes [Bundesministerium für Verkehr 1998].

Additionally the usage of ITS can lead to a reduction of mileage due to transport bundling and better loading capacity. The results from the COST321 Urban Goods Transport study indicate that vehicle mileage could be cut with about 10 % [ITS City Pioneers Consortium (B) 1998]. Reduced vehicle mileage leads to similar reductions in fuel consumption and pollutant emissions (Soot, Nox).

Cost reductions in  
logistical processes

Growing costs in goods transport, capacity barriers in the transport infrastructure and the preceded development of information and communication technologies has led to an additional application in goods transport. Quick and reliable information concerning transport resources and processes are known to provide more efficient planning and operation. Optimal route planning, dynamic traffic information, mobile communication, tracking and tracing are key issues within this area. With only a few delivery points to serve, the goods suppliers can better organise their deliveries. They benefit from cost reduction and ease of organisation. The retailer on the other hand is disturbed by only one concentrated delivery which allows him to concentrate his activities to the customer.

The planning, organisation and operation of telematics systems and services are primarily the responsibility of the private sector; whereas collective measures like traffic management systems have to be taken by the public sector. ITS can be applied to transportation infrastructure of highways, streets, and bridges, as well as to a growing number of vehicles, including cars, buses, trucks and trains. These information and communication technologies can also be used to manage and improve services offered to the public by governments, transit agencies and truckers offer services to the public.

Research activities

Since the mid 1980's there have been and still exist a lot of research activities dealing with ITS especially on European and national level (ASIT 1998) – European research activities have been for example DRIVE, PROMETHEUS and SURFF. Later some examples are given.

“Intelligent Transport Systems” (ITS) enhancing urban goods transport” has been the topic addressed at the 11<sup>th</sup> BESTUFS-workshop that took place at the 18<sup>th</sup> and 19<sup>th</sup> of September 2003 in Portugal. Due to the intense development activities and the lasting actuality of the issue it was decided to incorporate the topic “Intelligent Transport Systems in urban freight” into the fourth Best Practise Handbook (2003) within the BESTUFS thematic network. The present guidelines prepare the according material collection.

In the following some information are given in order to show the most important aspects of ITS and to have a common understanding of what is meant by “Intelligent Transport Systems” within the BESTUFS-thematic network.

## 8.2 Definitions, classification and description of Intelligent Transport Systems (ITS)

### Definition of ITS

ITS comprise a wide range of novel tools for managing transport networks, as well as services for travellers. Also called “Transport Telematics”, ITS tools are based on three core features [ITS (A) Consortium 1998]:

- information;
- communications;
- integration.

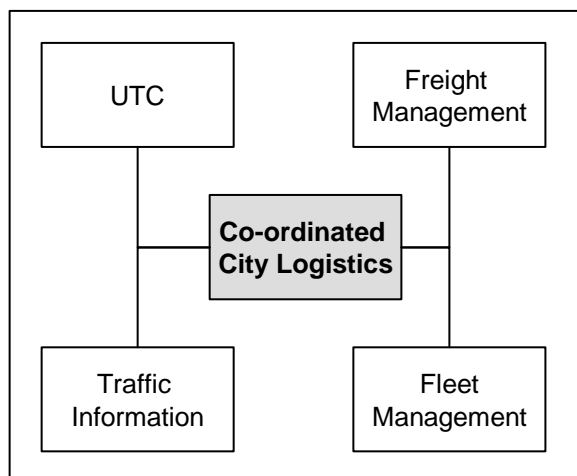
ITS can be seen as one step that could help to reduce negative effects caused by urban freight transport.

### Definition of the term telematics

Generally spoken the term telematics is the connection between the terms telecommunication and informatics. Transport telematics is telematics with regard to transport [Prognos AG 2001]. In international discussions telematics systems are titled as Intelligent Transport Systems (ITS). Telematics systems consists of technologies (hardware) and proceedings (software). Transport telematics is developed out of the availability of data entry, data preparation and data transfer under inclusion of mobile senders/receivers. A further development and additionally application possibilities can be assumed for the future [ASIT 1998].

### Transport telematics

Transport telematics can be seen as one possibility to improve sustainable mobility in the European countries. An intelligent transport system facilitates utilisation of the existing transport infrastructure in a higher quality and more effective manner; simultaneously it also helps to increase traffic safety, decrease accident rates and also lessen the number of car thefts. Transport telematics allows a choice of transport mode available for passengers, and, by means of easier access to information, promotes the development of public transport in towns and in their surroundings. In freight traffic, ITS makes it possible to obtain for instance an immediate review of the condition and actual position of freight. For a successful use of transport telematics applications it is necessary to establish an architecture at a national level and simultaneously to work at standardisation of ITS in Europe.



**Figure 99: City Logistics and links to other tools**

[ITS City Pioneers Consortium (B) 1998]

Route planning, proof of delivery and traffic information together with the mobile communication platform over which EDI messages are transmitted, constitute the backbone of a co-ordinated inner-urban distribution system.

Classification  
criteria

ITS can be classified according to:

- the type of application
- the dimension of application
- the user group and the usage

Classification  
according to the  
telematics  
application

In most cases we expect the **telematics applications** concerning urban freight transport in the field of road goods transport. Nevertheless maybe there are examples given of ITS usage in fields of other transport modes like inland shipping or rail freight or combined transport.

The following overview gives an idea of different ITS applications:

- Traffic information system
- Freight and fleet management systems
- Tracking and tracing of vehicles, loading units and consignments
- Traffic monitoring and traffic control
- Electronic management of lanes, electronic management of zones of delivery
- Navigation systems and route guidance systems, tour planning tools, trucking route signalisation
- Electronic freight exchange systems

- Driver assistant systems (e.g. PDA = Personal driver assistant)
- Telematics applications for the management of dangerous goods transports
- Automatically fee collection system in connection with road pricing
- European train control system (ERTMS/ETCS)
- Electronic management of operation in rail freight transport
- Automatic vehicle identification
- Automatic Guided Vehicles (AGV)
- Information and communication technology (ICT) in pre- and end-haulage
- Access control and electronic operational management of terminals
- On-Board-Computers for delivery vehicles

Classification  
according to the  
dimensions

A further very important differentiation has to be made regarding the **dimension of telematics application**. ITS can cover two dimensions: a policy dimension and an operational dimension. It can be differentiated between generally *traffic management systems* which are mostly intended by official bodies and *operational systems* which are used between private enterprises. Telematics applications in the field of traffic management systems are for example: traffic monitoring and control, a traffic information system, trucking route signalisation etc. Operational telematics applications are for example: tracking and tracing of consignments, the usage of navigation systems, tour planning tools etc. In case of operational telematics systems a further differentiation can be made between *intraoperational* systems (internal usage in the company) and *interoperational* systems (between different enterprises).

Classification  
according to the  
user and the usage

An additional distinction can be made regarding the **usage and user group of ITS**: Is the application a more public or private usage or used in both ways? E.g.: a fleet management system can be seen as a private usage whereas traffic management systems are open for the public. Furthermore the use in dependence on the group of users may be of interest. Is it a single user or a group of users? Single user in this connection means that for example only one company uses their own fleet management system. Whereas group usage means that more than one person, institution or enterprise uses the application. A traffic management system or electronic lane management for example can be seen as a group usage.

### 8.3 Explanation of different telematics applications

Traffic management system

A traffic management system is a general term which describes the usage of telematics applications for managing traffic flows. The aim of a traffic management system is to collect data about the actual traffic situation, to evaluate the current situation and to deliver information to users and to manage problems by reacting against capacity strains. In most cases traffic management systems are used in an urban context where traffic volumes are higher compared with rural areas. But there are also applications that manage problems in highway traffic out of agglomerations.

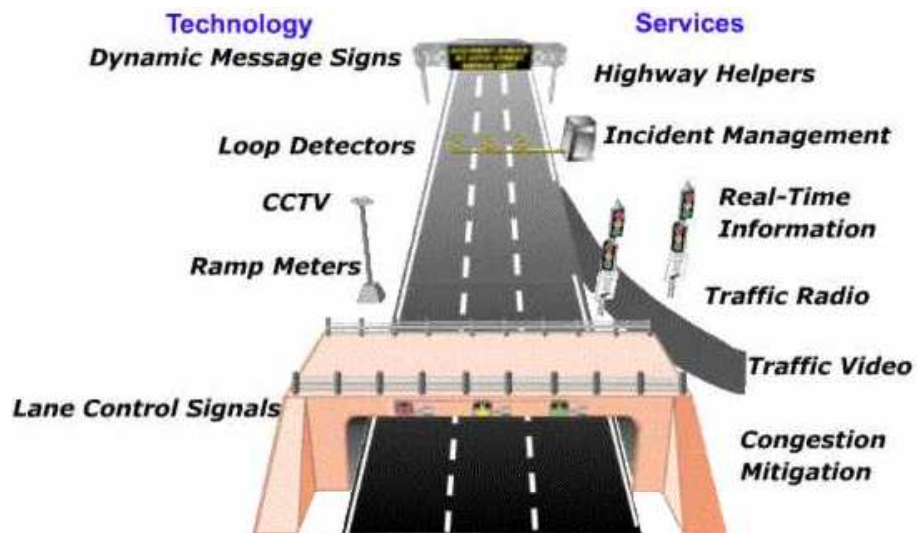


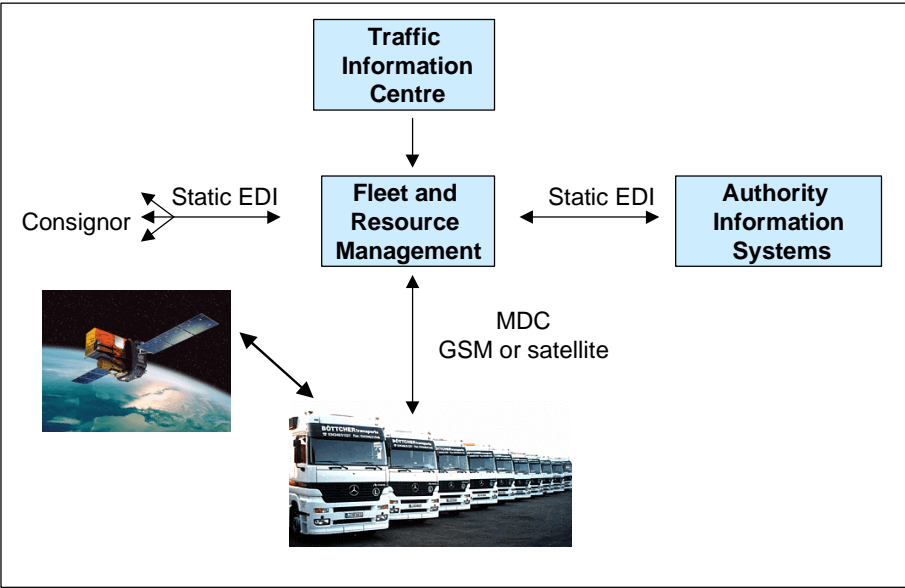
Figure 100: Traffic management system

Fleet Management

Optimisation of vehicle operation of a fleet by actualisation of status position of the vehicle. Often in connection with freight management.

Standardised EDI messages detailing location, quantity and time of the shipment are exchanged between the consignor and the carrier. This reduces human errors and facilitates clearing with authorities (e.g. customs). It can also reduce the number of wrong deliveries. Continuous communication with the vehicles and automatic vehicle location allows for continuous control. The trip event control system included in the central computer enables a continuous comparison of the planned trip moments with the actual situation allowing for the arrival times to be calculated more accurately. Trip and route planning software included in the central computer allow more accurate planning of trips and routes based on information from previous trips. The on-board computer registers information about the driver's activities and vehicle performance [ITS City Pioneers Consortium (B)

1998].



**Figure 101: Fleet Management System**

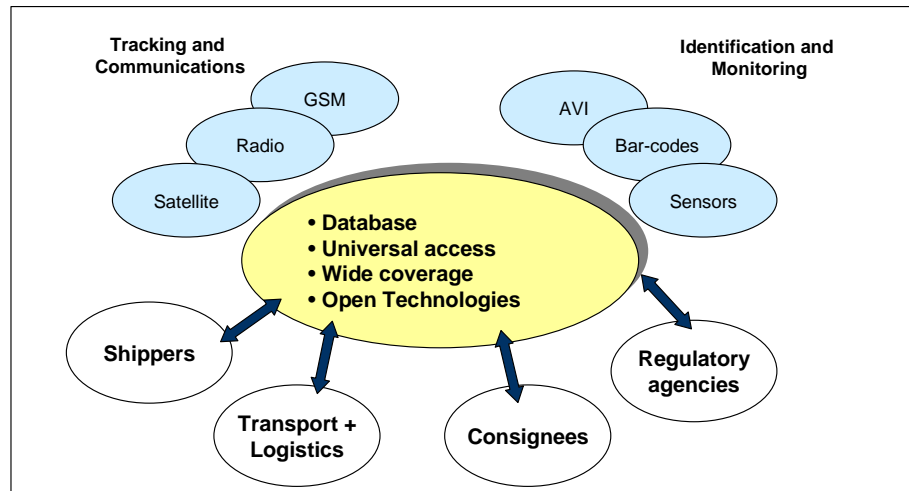
[ITS City Pioneers Consortium (B) 1998]

Freight  
Management  
system

Tracking and tracing of freight and assignment to vehicles by registration of the vehicle position (for example at transshipment terminals).

Based on the status information of wagons and loading units, the system will act as a “nervous system” for the signals from the tags and readers and the EDI messages. The different messages will be stored in a central database. Shippers will be able to place their orders, that will be taken into account by the pool of transport and logistics companies. Since all the interested parties have full access to all the information, not only the system administrator, but also the clients will be able to monitor the location and the status of a cargo throughout the logistics chain.





**Figure 102: Freight Management System**

[ITS City Pioneers Consortium (B) 1998]

Terminal management

Optimisation of transshipment processes at terminals by data transfer from arriving vehicles and information about their loading.

Traffic information

Information for drivers about the actual traffic situation by traffic data from different sources. Collected traffic data coming from the movement of vehicles are called Floating Car Data (FCD). In order to increase the transport efficiency, it is useful to provide the truck driver with information about the traffic situation on his itinerary. Therefore a link with the Urban Traffic Control centre and/or the regional traffic information centre can be established using RDS/TMC, GSM or any other radio communication link.

Traffic influencing measures

Automatically influencing of the traffic situation (especially speed limits) on basis of actual traffic data. Especially under usage of automatic change of traffic signs.

Electronic access control

Restrictions of road usage for determined types of vehicles. Automatic control of the authorisation and permission for passing.

The basis of a scheme is to licence individual vehicles that are authorised to enter a controlled zone. The access permit may be a simple ticket or “vignette” displayed on the vehicle. New systems use an electronic tag which permit authorised vehicles to pass an electronic “gate” or “cordon” without stopping. On-line video enforcement allows the system to record automatically the passage of any unauthorised vehicle and issue a violation notice.

Intermodal route planning	Information about the optimal combination of different transport modes and description and support of route choice. Route planning helps to reduce journey times and vehicle mileage, reduce costs and improves the reliability of delivery schedules.
Dynamic Routing	Description of the optimal route in consideration of information about the actually traffic situation and navigation support for the driver for route decisions.
Adaptive routing	Adaptive route decision (especially for special transports) on basis of traffic and risk data. Especially for dangerous goods transports.
Electronic Freight Exchange system	Electronic Freight Exchange Systems are internet based marketplaces where freight and/or loading capacity can be offered. Registered participants (closed system) or non-registered persons have the possibility to bid for freight or for loading capacity. The principle is similar to an auction or bourse. This system functions like a forwarder and is also name "virtual forwarder".

## 8.4 ITS and urban freight transport

Freight transport  
and telematics

Freight transport is a wide field for telematics applications. There are existing different ITS for various operations. The application of logistics and fleet management systems are used for the optimisation of loading capacity and for the efficient management of the transport chain. Especially in combined transport ITS contributes to an optimised logistical management of goods flows by different modes of transport. Navigation systems are able to determine the exact position of freight movements and the application of tracking and tracing systems can support logistics services, customers etc to get status information about the actual position of loading and helps to estimate the point of time when the expected delivery will reach them. There are given more examples which will be dealt with in this handbook.

Urban freight  
transport and ITS

Telematics for urban goods transport includes among others the combination of electronic equipment and devices for traffic management, infrastructure control and signalling using innovative or smart technologies. The use of telematics for fleet and freight management and the management of freight parking/load zones are examples that fall within the sphere of this theme. It is not easy to make a detailed differentiation using ITS in urban freight transport, because most of the applications are covering the full transport chain which normally oversteps the border of city areas. Nevertheless there are examples that directly influence urban freight transport

Application  
possibilities in  
urban freight  
transport

The following applications may be of interest for urban freight transport:

- Freight and fleet management systems, automatic monitoring of vehicles and loading, tracking and tracing and proof of delivery, route planning tools (only for vehicles used in intraurban freight transport e.g. vehicles of local enterprises that are only acting regional)
- Electronic management of zones for delivery
- Electronic access control
- Trucking route signalisation
- Automatically fee control system in connection with road pricing
- Traffic monitoring and traffic control (enforcement)
- Electronic operational management of terminals
- ITS for the management of dangerous goods transports
- On-board-computers for delivery vehicles

- Electronic freight exchange systems for urban freight transport/virtual freight distribution centres e.g. the virtual freight distribution centre (VGVZ) in Berlin: The idea of a virtual freight transport centre is to bundle transport flows in urban regions and to use environmentally transport modes like railways and inland waterways. The following Figure 103 [Baumgarten et al 2000] shows the realisation of a virtual freight distribution centre combined with single projects.

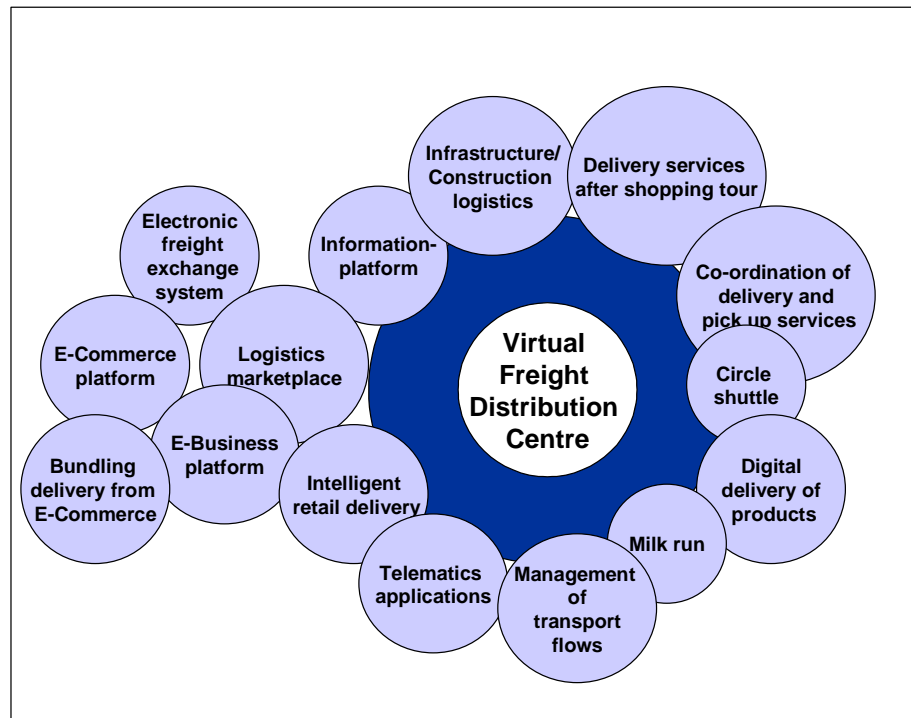


Figure 103 : Concept of a virtual distribution centre

## 8.5 Related research activities

There are many examples dealing with ITS topics in the area of research activities. Most of these activities are existing with a practical approach. The following European<sup>61</sup> and national research projects related to ITS have been identified:

European research projects:

The systematic research activities concerning ITS in Europe started in the mid of the 1980s. At this time the European Union initiated a research programme called DRIVE (Dedicated Road Infrastructure for Vehicle safety in Europe). In the domain of research and development, ITS projects, for example those promoted by the 5<sup>th</sup> Frame Programme of EU, include not only visions but also concrete results and pilot projects.

In the following selected research activities will be represented and if available research activities regarding ITS and urban freight transport.

- **COST 321 (Coopération européenne dans le domaine de la recherche scientifique et technique) – Urban Goods Transport:** The COST 321 action aimed to study the design and operation of innovative measures to improve the environmental performance of freight transport in urban areas. It has examined the reduction of air pollution, noise and energy consumption by optimising the use of trucks in city traffic by the application of modern logistical devices and appropriate administrative measures. Twelve European countries took part in the COST project.
- **PROMETHEUS:** In the mid 1980's the European motor industry, for the first time, began co-operative research and development. PROMETHEUS, the industry's programme, was based on an assumption that basic research into the road transport of the 21<sup>st</sup> century was a task too big for even the biggest firms on their own. The PROMETHEUS research programme included car companies from six countries, automotive suppliers, electronics companies, government research laboratories and universities. The member bodies began work in 1986 on pre-competitive research into ways to achieve safer driving, smoother traffic flow and improved travel and transport management. Investment in PROMETHEUS has been 900 million ECU. Over a dozen systems reached demonstration stage, many of which will ultimately appear on standard production vehicles. These comprised among others:
  - Driver status monitoring to detect and measure drivers' alertness and warn them of the onset of drowsiness
  - Lane keeping support to assist drivers to stay within motorway lanes

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<sup>61</sup> Additional information on the EU transport research programme is available at the programme's knowledge centre: <http://europa.eu.int/comm/transport/extra/home.html>

and to follow winding roads

- Fleet management to keep in touch with and locate trucks to optimise the movement of goods and reduce environmental impacts
- Dual mode route guidance to provide drivers with the best route given prevailing road and traffic conditions
- Travel and traffic information systems to provide interactive access to details about public transport, park & ride, and traffic conditions
- Co-operative driving to exchange information between vehicles to improve safety and traffic flow.

- **4<sup>th</sup> Framework Programme:** In the 4<sup>th</sup> Framework Programme the research and development programme TAP (Telematics Applications Programme) supported the development of telematics in the field of transport. 110 projects have been supported with a budget of 220 Mio. EUR. The focus was on driver information, intermodality and public transport. Within all projects telematics applications were developed and evaluated.

- **eDRUL – eCommerce Enabled, Demand Responsive Urban Logistics-:** is a research and innovation project in the field of e-logistics. eDRUL aims to pilot innovative urban freight distribution schemes, advanced IT solutions and integration with e-commerce/e-business infrastructures allowing on-demand planning of the distribution of goods.

Partially funded under the EC's IST program, the eDRUL project will last 30 months and will investigate, develop and demonstrate innovative e-logistics solutions taking as a reference four different European sites: Siena, Lisbon, Aalborg and the "Kenniswijk area" around Eindhoven.

Objectives: eDRUL is aiming to investigate, develop and validate an innovative e-logistics platform, and supported service models, for improved management of freight distribution processes in urban area. Strongly based on integration with e-commerce/e-business architectures.

- **SURFF:** SURFF is a 3-year project co-financed by the European Union in the scope of the 4<sup>th</sup> Framework Programme and specifically in the Transport Telematics Applications Program of DGXIII. This project is a research project about the network operations of freight centres and city logistics (urban distribution) and aimed to develop and evaluate a number of telematics solutions which were applied to freight centre users and urban distribution communities.

The main objectives of the SURFF project were:

- to develop more efficient operations at freight centres by optimising the information flows
- to improve transshipment of freight between different modes of transport (especially in multimodal chains)
- to define the user needs and specific requirements of small and medium sized companies in order to encourage their use of transport

telematics

- to demonstrate that telematics can contribute towards achieving sustainable freight flows in urban areas and to reduce freight transport related environmental aspects

Within SURFF, the various telematics applications were tested and evaluated at seven sites located throughout Europe. [<http://www.euroweb.net/tech/about.htm>].

National general  
research projects  
on ITS

- **Germany (INVENT – Traffic Management in Transport and Logistics VMTL):** The project Traffic Management in Transport and Logistics is pursuing a vision of improved transport efficiency in delivery of goods. The idea is to optimise dynamically the utilisation of transport routes, delivery vehicles, as well as delivery period, mobile communication and computing resources. In addition, the customer will benefit from new opportunities for monitoring and controlling the transport of his goods. The goal of the project Traffic Management in Transport and Logistics is to investigate how existing and emerging information and communication technologies can be used to manage the flow of transported goods more efficiently and thus to reduce traffic demand. The focus of the project is on local and regional traffic flows. Pick-up and delivery traffic, particularly in urban areas, the so-called “last mile”, offer a substantial potential for implementation of new concepts in logistics. Planning and management capabilities should be designed and optimised with a precision extending to the exact street address. To this end, recent developments and opportunities for utilisation of public mobile communication networks and intelligent delivery route planning tools are to be investigated.  
( <http://www.invent-online.de/downloads/VMTL-handout-E.pdf>).
- **National research & development – activities in Austria** enforced by the Ministry of Traffic, Innovation and Technology is the so called “IV2S Intelligente Verkehrssysteme und Services”; i.e. “Intelligent traffic systems and services”.  
The programme “Intelligente Infrastruktur” (i.e. intelligent infrastructure) is focussing on all kinds of information- and communication – technologies operating in logistic systems. The aim is to increase efficiency in transport and traffic and to increase traffic security by using new technology and ITS. Out of 50 submitted projects, 25 winning projects have been presented to the public in May 2003. None of these projects has direct relation to urban freight transport. Three of them are dealing with new methods of classifying vehicles, which could probably find adoption in urban freight transport in the future.
- **National research & development – activities in Belgium:** National projects and surveys on ITS exist and are planned:

- “Towards a plan for technically limiting speed of vehicles in a safe traffic environment”, by the Centre for Sustainable Development, University of Ghent (2000). This Research centre is very active in ITS use for a better traffic safety;
- A project on cruise control in trucks is planned.

On the European level, Belgium has contributed/is contributing to several projects:

- ERTICO: is an international public/private partnership for ITS and services in Europe, including several Belgian actors;
  - STARDUST (towards sustainable town development: a research on deployment of urban sustainable transport systems – 2003), evaluating different ITS systems on private vehicles;
  - RIS – the project River Information Services: (since 1998) a river traffic management system;
  - European Rail Traffic Management (ERTM).
- **National research & development – activities in The Netherlands:** There are currently no real research activities on ITS in the field of urban freight transport. In the public field extensive research has been carried out on underground logistic systems, either through dedicated tubes or by using existing underground infrastructure (joint usage of metro system). These initiatives all stranded because of high costs. Currently there is a focus on traffic management and standardised load units for urban distribution. There has been a focus on development of an innovative road pricing system (kilometerheffing) in the previous years, but implementation of such a system is postponed till at least 2007.
- **National research & development – activities in France:** In France one experiment can be noted regarding ITS and urban freight. Concerning city management, the city of Rouen (region of Haute-Normandie) together with the Chamber of Commerce have set up a system of traffic live information coupled with delivery round reorganisation software. It is based on communication networks of type GSM, GSM data, GSM/SMS. The relevance of this system is largely based on its diffusion on the extra-urban sphere including the use of multimodal techniques. Rouen faced a major problem when they tried to implement cameras on the street that would provide instant images on the internet. This is legally impossible for the moment in France.
- **NFP 41 – Switzerland:** Within the NFP 41 (National Research Programme Transport and Environment) several research projects with regard to transport telematics have been supported by the Federal Swiss Authority for Transport. 5 projects within the module E “Traffic System Management – Potentials and Impacts” have been carried out



by several consulting companies and researchers. The aim of those projects has been to answer the question towards existing and future technical options dealing with traffic management. Only the project “Perspectives of Transport Telematics” had an overall approach, the other four projects deal directly with concrete applications in the area of transport telematics. The NFP 41 was finished in January 2001 but the Swiss Federal Authority for Spatial Development is further involved in supporting the ideas and research activities of NFP 41.

Additionally the Federal Road Authority (ASTRA), the Swiss Association of Road and Transport Experts (VSS) and the Association of Swiss Traffic Engineers are launching further research activities.

- **National research & development – activities in The UK:** There are existing different national research activities linked with international EU activities like THEMIS and ROSETTA.
- **Czech Republic (Road Traffic Protection System for Pedestrian Zone in Brno, ROTRAPS – preliminary acronym in English):** The project was initiated by the Brno Municipality Police, responsible sections of the Brno Municipality, consultant companies and technology suppliers. Major components are tested now. The planned implementation will take place in 2004. System ROTRAPS is based on system for fully automatic recognition of the license plates. The information are collected by CCTV cameras in the areas of entrances (“gates”) to the pedestrian zone in Brno centre. The picture is analysed by the special computer system. If car has the permission for the entry the entrance would be opened automatically. Further applications of this system are also expected for other cities in the Czech Republic, but the future process of implementation depends on results of this pilot project. Many similar implementations in other following Czech cities are possibly expected.
- **Hungary (DEKIR – Traffic control centre in Debrecen town):** The project was initiated by the Local authority of Debrecen. Currently the project is in test phase. DEKIR is a city traffic control system analysing the current traffic flow and giving information for users (both public and private). It is based on dynamic information service connected to a route planning tool. This project covers all the essential parts necessary for traffic. There are other plans to initiate similar project in other cities (for example Budapest).

## 8.6 Situation at country level

17 countries  
represented

Material on 11 West-European countries has been collected, covering most countries of the European Union except Belgium, Portugal, Ireland, Luxembourg, Denmark, Sweden and Finland, but including Switzerland, Japan and Australia (see Figure 104). Regarding the NAS-countries material on 6 countries has been collected, covering most countries of the NAS-countries except Cyprus, Latvia, Lithuania and Malta.

A detailed report on the countries situation concerning ITS is given in Annex I.



Figure 104: European countries covered by the material collection

### 8.6.1 Importance of ITS for urban freight

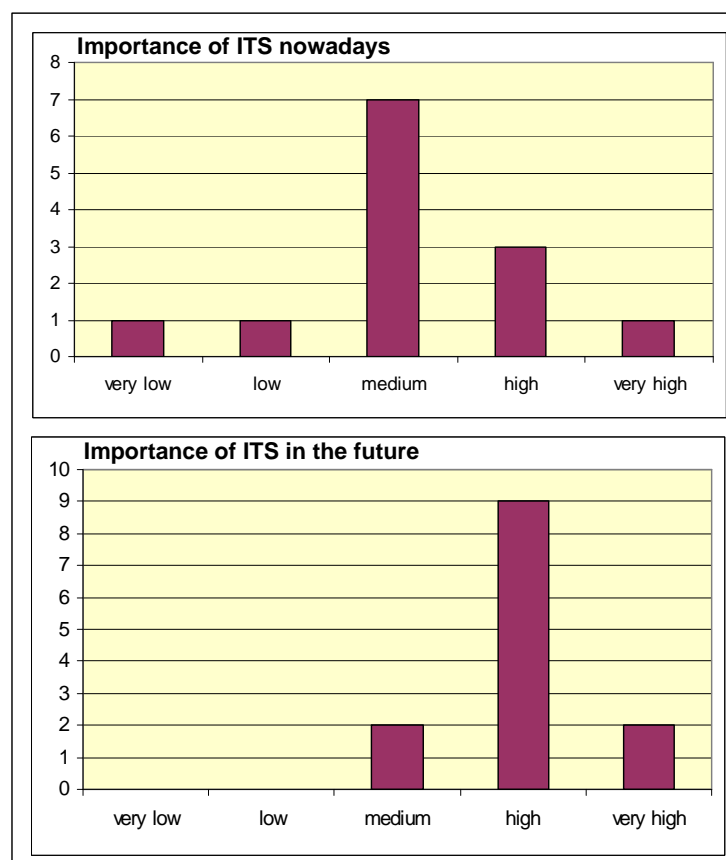
In order to give a brief impression of the relevance of the topic the BESTUFS partners participating in the material collection were asked to estimate the

importance (or relevance) of ITS for urban freight in their country – in the past, nowadays and in the future.

Increasing  
 relevance

The importance of ITS in urban freight transport will increase in the following years. Nearly all experts of different countries estimate that ITS in urban freight will play an important role in their country in the future. Whereas ITS in transport play not a crucial role in future ITS is considered to play a more important role (compare results of the survey Figure 105).

**Figure 105: Importance of ITS nowadays and in the future**



Absolute values (13 mentions)

Relevance of ITS in  
 the NAS-countries

The process of democratisation and economic reforms in the NAS countries from the end of the eighties onwards led to a considerable change of transport flows, since trade patterns in CEE countries were oriented more and more towards countries of the European Union. Road transport has increased dramatically. The rising level of car ownership and traffic congestion has exceeded all earlier forecasts. Although the level of car use and traffic congestion has not yet reached Western levels, the negative

effects of increased car traffic on the quality of life through time losses, accidents and environmental damage, are already realised.

More and more commerce and housing areas are located at the periphery of towns, which are not always easily accessible by public transport. Car ownership is increasingly seen as a status symbol. As a consequence of growing car ownership, the use of public transport services will decline further. Additionally most of the large cities share the experience of increasing freight transport, due to growing commercial activities. However rail still plays a far more important role in freight transport in Central and Eastern Europe than in the EU.

## 8.6.2 National situation regarding ITS

In the following a summary of experiences in projects with application of telematics will be given. There are existing of course a lot of examples of using ITS.

Most ITS-projects are electronic fee collection and traffic management systems...

Most project examples show that the main field of application of ITS is in the field of electronic fee collection, in the area of traffic management systems and in private operated fleet management systems.

...in urban freight transport are mostly private operated fleet management systems of interest

ITS in urban freight transport is often in context with privately used applications like fleet management systems. As seen the most ITS applications are not only with focus on urban freight but on a broader regional or even national level. Therefore it is hard to identify relevant telematics system that are only used in city logistics. Especially those which are launched by official side are rare.

History of ITS started in early nineties

The last decade of the previous century has brought a breakthrough in ITS. As the achievements of computer technology became accessible also for transport planners and users likewise other user groups the research has started to get more and more benefit in the field of transport. It got a good mark even in the early stages as a tool to reach transport policy targets on both national and local levels. In spite of these the first research results were a subject of heavy debates whether it will be worth the money or accepted by the users, especially in passenger transport. These fears have been overruled by national and international experiences and by now ITS proved its importance and got a non-questionable position among priority fields.

Motivation and approaches of ITS in urban freight transport

There have been existing different motivation reasons and approaches for setting up ITS. On the one hand environmental aspects like air quality and noise which directly influence the quality of life in urban areas are aimed to improve the situation by using ITS. On the other hand companies aims to reduce their costs in logistical chains by the usage of telematics like fleet management systems or route planning tools.

In the following a very brief summary on the national situation in the various countries is given.<sup>62</sup>

Australia: ITS in connection with urban traffic problems related to port freight transport

In Australia the problems in urban areas are mainly coming from freight transport in relation with container ports. Because of the freight flows to and from the ports inner-urban traffic problems are mainly increased by those reasons. Telematics applications appear in automatically port management systems as an overall traffic management system. Only if the problem of goods flows to the ports could be solved this could be a chance to improve the general urban traffic situation.

Freight is now becoming recognised as a key area of economic importance and ITS can offer major increases in efficiency and will continue to grow in interest.

Austria: Nowadays ITS is not a major topic

Within the last 5 years the topic of Intelligent Transport Systems has gained little more attention in Austria from various stakeholders like political authorities, transportation companies, IT-service operators, research and development institutions and the industry. Especially enforced by the calls under the EC 5<sup>th</sup> framework programme for R&D activities, some projects and working-groups have been initiated, trying to find solutions for traffic and transportation problems by using innovative ITS concepts and models. Nevertheless ITS is not a major topic Austrian stakeholders are coping with.

Belgium: rarely focus on urban freight transport

Use of ITS in freight transport represents nowadays in Belgium a highly interesting topic for all concerned actors. A number of examples exist in Belgium, but they rarely concern specifically road or rail urban freight transport. Both users/operators of ITS in transport (public authorities and private companies) have a great interest in ITS for freight transport.

Czech Republic: many different stakeholders

Transport telematics in the Czech Republic is supported by various stakeholders . The first pillar are organisations like the Ministry of Transport and Communications, cities and regions, etc., the second pillar refers to academic institutions like the universities (Faculty of Transportation Sciences, TU Prague e.g.) and research institutions (Transport Research Centre – CDV/TRC e.g.) engaged with transport telematics and the last pillar is the private sector. Many of these organisations are associated with the Association for Transport Telematics and are involved in several very important ITS projects and also in the process of co-ordinated deployment of transport telematics.

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<sup>62</sup> A more detailed report on each country's situation concerning ITS is given in Annex I.

France: ITS-usage in urban freight transport is not very common

French cities generally have not made a heavy use of ITS yet for city management and planning. Technical services (traffic management, parking, etc.) are reluctant to do so, for two reasons: cost of maintenance of such systems and privacy issues, which respond to very strict regulations in France. What has been largely developed however is the system of variable message signs on French urban highways.

The level of awareness on ITS and urban freight is low and French authorities (but also business) have not yet appreciated the interest of this system. However, GPS and development of embarked information in France can support its use and its extent.

Germany: ITS is of high relevance in Germany – a lot of research activities are done

Without distinguishing between urban and interurban transport it is to state that ITS applications have a high relevance in the German transport sector. Various approaches and actors are active in the field of developing, testing and implementing ITS applications.

The main fields of ITS are

- traffic guidance systems
- traffic alert systems, route guidance and influencing systems
- dynamic routing systems

ITS was in past to a large extend a research activity. Marketable products are now emerging from this activity. It is to expect that the cost for telematics services will decrease while the number of users will increase in the future. Traffic guidance systems are implemented and currently tested in large cities like Berlin and Munich.

Greece: ITS applications have gained more attention nowadays, especially in freight transport

The main major ITS applications in the field of freight transport are various tracking and tracing systems that have been installed in the various (road) freight vehicles used for urban or interurban deliveries. These are still very limited in scope and number of vehicles equipped.

The situation has recently changed with the telecommunication infrastructure to be continuously upgraded and the individual actors to enter the world of the information technology (IT) in managing their internal operational and business affairs. This trend has naturally emerged in the dynamic sector of freight transport with the high competition, high turnover and low margins. IT priorities in both the private and public sectors are mostly focused on the upgrading of internal operations in order to increase productivity. The initiatives taken so far have started to present the benefits that ITS applications have and encourage the commencement of new activities and involvement of more players.

Hungary: Generally the most ITS measures/applications are still in an early stage

Generally the most ITS measures/applications are still in an early stage. The users can not feel the benefits of different systems, because those are not totally developed only some modules of them are existing. There are differences among the regions in Hungary, so the central region (including Budapest) is better developed than the other regions.

Fleet management systems are important in international freight transport. Traffic management first of all is in current use at motorway management. The importance has increased in the last years in urban traffic management.

The general concept of the local authorities is to reduce the traffic in the cities. In the last years the main cities start to develop traffic control centres based on telematics infrastructure. Some of the public transport companies use tracking and tracing systems. The general concept at the transport companies is to minimise the costs.

Italy: no significant examples of ITS usage in urban freight transport

No significant examples of ITS systems take currently place in Italy for urban freight distribution. However, the technologies tested in other fields are providing a solid foundation for future projects. ITS technologies are applied in Italy to the following three main groups:

- road transport
- railway transport
- freight villages, ports and mode exchange terminals.

Japan: very advanced in ITS application – application nearly in all areas

In Japan ITS has been developed and deployed in many areas including freight and fleet management, traffic management, automated motorway systems, traffic information systems, electric toll collection systems, navigation systems for pedestrians, etc.

The Japanese government has made great efforts to develop ITS. The main objectives of developing ITS are: (a) alleviating road congestion, (b) reducing traffic accidents, (c) improving the environment, (d) promoting economic growth (e) improving the quality of life and (f) re-vitalise regional communities.

Netherlands: focus regarding ITS is on better usage of existing infrastructure

In the Netherlands there are currently very few initiatives of Intelligent Transport Systems with specific relevance to urban freight distribution; most ITS projects, solutions or initiatives have a generic transport relevance on a national level. The value and opportunities of ITS are clear. Because of the high congestion rate on the Dutch roads, the public focus on a better usage of existing infrastructure by ITS measures. In the private sector, fleet management and planning systems are well used.



Poland: climate for ITS applications is good

Growing motorization and congestion directs attention to the public and private sectors against measures aiming to improve the efficiency of the transport system, including freight transport. Advanced methods of ITS are getting more and more attention.

At the state level, there is evidence that the climate for the deployment of ITS is generally positive. It has been reflected in the last governmental documents and declarations concerning building information society and priorities in transport policies.

At the local level (cities) attention is concentrated on congestion relief and reduction of environmental impacts.

Generally, cities are more advanced in deployment of ITS than the central national administration. Private and public enterprises, especially larger ones are already implementing standard ITS solutions.

Slovakia: new transport flows makes new ITS solutions affordable

The great changes of democratisation and economic reforms after 1989 led to a considerable change of transport flows. This fact makes appropriate solutions affordable. ITS applications can be seen as one tool avoiding negative impacts.

Transport telematics in the Slovak Republic are mainly influenced by:

1. organisations like the Ministry of Transport and Communications, Slovak road districts – Slovenska sprava ciest (SSC), cities and regions.
2. academic institutions like the universities (University of Zilina, TU Bratislava e.g.) and research institutions (Transport research institute – Vyskumny ustav dopravy, Zilina, and Telecommunication research institute – Vyskumny ustav spojov) engaged with transport telematics.
3. organisations concerned with the private sector, which will be competing in acquiring the order for solving the selected work packages. Some of these organisations are associated in Association ITS Slovakia – Zdruzenie IDS Slovensko involved in several very important ITS projects and also in the process of co-ordinated deployment of transport telematics.

The role of the Ministry of Transport and Communication is to coordinate the preparation of the national architecture for telematics, coordination of research and development projects for telematics, further support of European projects and support of CEN TC/278 and ISO/C204 standardisation processes.

Slovenia. Priority on traffic flow optimisation

ITS has gained lately more and more important in Slovenia. Technological development has made it possible to track traffic more efficiently and act according to the results.

Government and city authorities are following the strategy of traffic flows optimisation, reduction of traffic in the city centres etc. Automatic traffic

counters are more and more noticeable on Slovenian roads. Government is evaluating road utilisation through direct (automatic) traffic counting systems. There is also a strategy of optimising traffic flows on highways.

Spain: relevance is still low

The relevance of different types of ITS (freight and fleet management, traffic management) is still low. Only big companies use technologies like GPS and communication systems between transport vehicles and traffic control management. The used concepts are focused on localisation system. These technologies are usually developed by companies. In Barcelona there are some good examples of ITS in urban goods transport with regards to access control and Variable Message Signes [see presentation of Mr Simon Hayes – 1<sup>st</sup> bestufs workshop]

Switzerland: a lot of efforts for the improvement of traffic flow by usage of ITS

There are a lot of efforts in improving traffic flow within the Swiss transport systems. The political authorities show the willingness to spend money on research activities and practical implementation in the field of telematics. The main activities from political side are concentrating on traffic management systems with the aim of optimisation in traffic flow. These activities are mainly focussed on a nation-wide application and are not specialised on urban freight transport.

United Kingdom: High importance of ITS nowadays and in the future

All forms of ITS are relevant and used in the UK: Traffic management and driver information systems are developed at a national trunk road level by the Highways Agency (or equivalent in devolved areas). The UK Government is encouraging the greater adoption of ITS as an integral part of its 10 years plan for a modern transport system.

Main ITS applications in the UK nowadays are: traffic monitoring and control, traffic information systems, freight and fleet management systems, tracking and tracing. Tour planning tools, navigation systems and onboard computers for delivery vehicles. Most of the application does affect both, urban traffic and non-urban traffic. Most of them are operated by private enterprises. The importance of ITS is still high and it is expected to be high in the future.

It is not known of any city that provides traffic information specifically to the freight sector, although London is considering this option. In the London case it is envisaged that traffic condition information would be gathered across the city through the central control centre and disseminated via an Internet facility and VMS. Another area that is considered as offering a potential for telematic applications is distance based tolling that could be used for differentiated urban road charging schemes. However these are merely ideas at this stage and are not active.

### 8.7 Regarded case studies (project-level)

31 projects  
collected

In total 31 projects from most of the participating countries have been collected. From those 10 projects from NAS-countries are given.

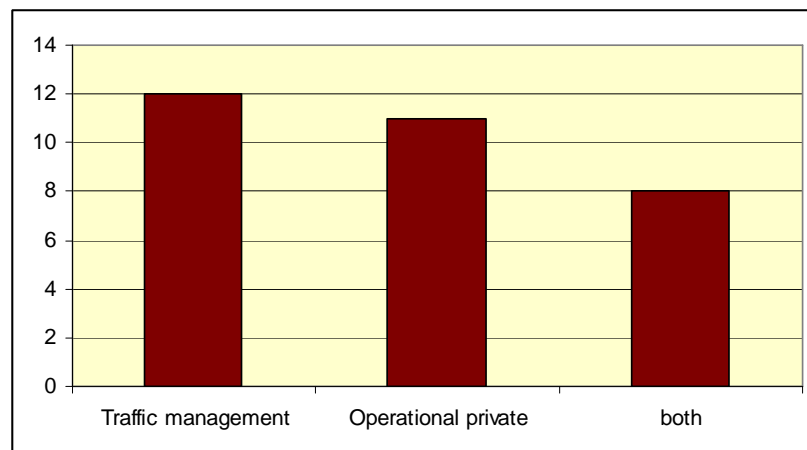
Table 11 gives an overview about all collected projects, the affected transport mode, the kind of application and the user group.

Focus on ITS  
applications in road  
transport

The selection of projects includes traffic management systems supported mainly from public authorities as well as operational private managed systems. There are 12 examples of traffic management systems, 11 private operated ITS applications and 8 which includes both possibilities of application.

Except one application all projects are given with focus on road transport.

**Figure 106: Kind of telematics application**



Fields of activities  
and projects

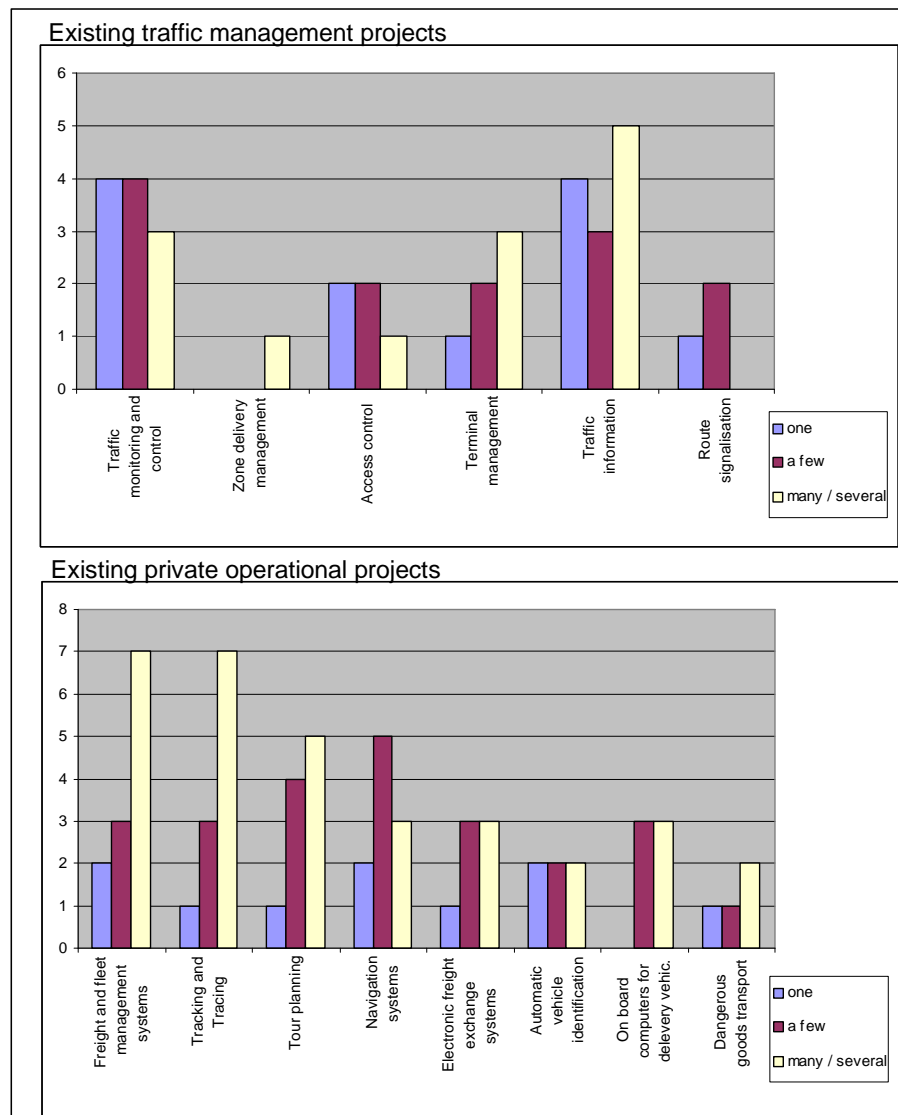
The Figure 107 shows the existing fields of activities. The surveyed experts should name the activities in different fields of telematics applications both in traffic management and private operational activities. The classification was made for the existing projects as follows: one existing project, only a few (2-3) existing projects and many / several existing projects.

The result shows that with regard to traffic management systems the most existing projects are traffic information projects covering the whole field of traffic information. Of further importance are traffic control and monitoring which are directly linked with traffic management systems. For countries with seaports, but also for inland terminals, terminal management is of importance.

Private operated telematics projects that exist are mainly freight and fleet management systems and tracking and tracing. Also tour planning systems are of relevance.

Comparing public traffic management systems and private operated ones it can be seen that operational management systems are of higher importance. So the most experts stated that many private operated projects are existing (32 “many/several” private operated projects and 13 “many/several” traffic management projects).

**Figure 107: Fields of existing activities in ITS**

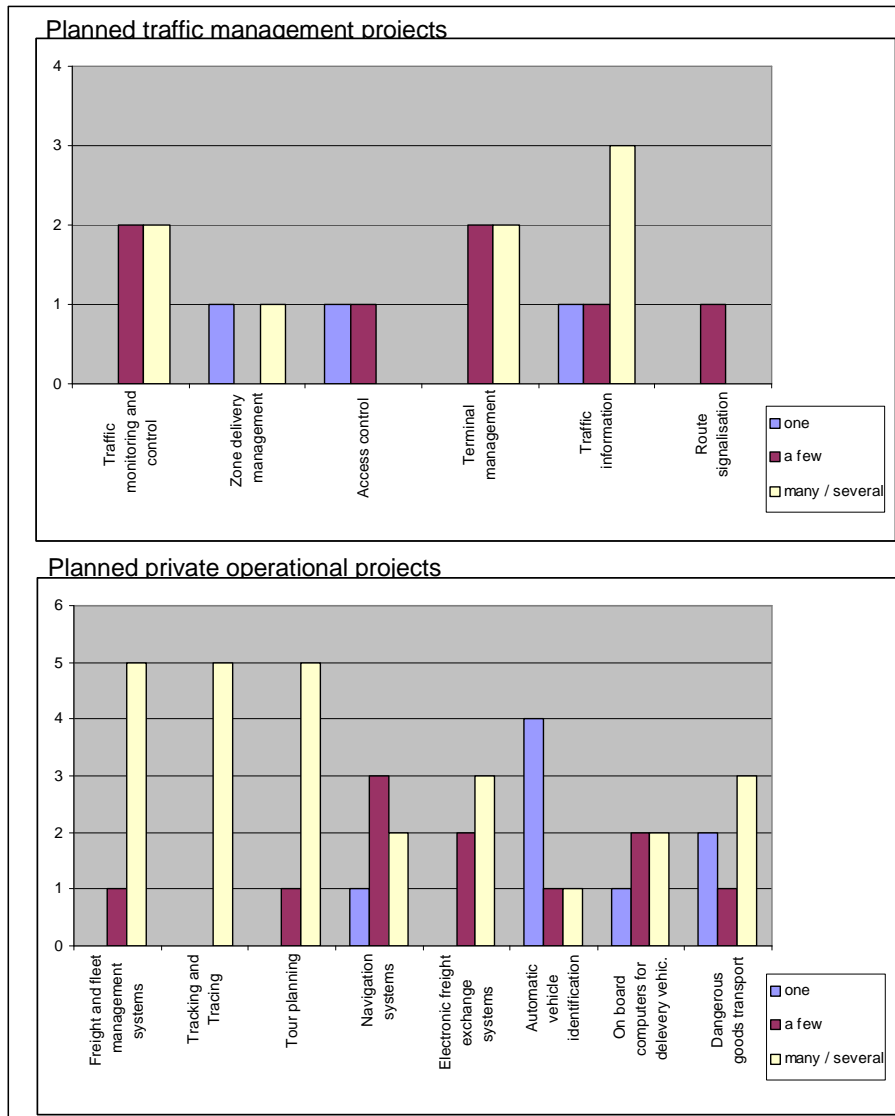


Future activities

The Figure 108 shows the relevance of planned projects with regard to ITS. The experts have given the relevance of planned projects in their countries by making the following difference into “one”, “few” and

“many/several” projects. Taking “many/several” projects into account that are planned so the most of them are freight and fleetmanagement systems, tracking and tracing as well as tour planning systems. This correspond to the situation with existing activities. Also the planned projects are mainly private operated ones.

**Figure 108: Planned activities in the field of ITS**



**Table 11: Overview on collected ITS projects (marked projects are presented in detail)**

Country	City/Region	Name of project	Affected Transport Mode				Kind of Application		User Group	
			road	rail	Inland shipping	Combined	Traffic management	Operational private	private	public
AT – 01	Danube area	ALSO Danube	✓		✓		✓	✓	✓	✓
AT – 02	Austrian Bridges	DyGeS	✓				✓			✓
AT – 03	Salzburg	Interurban. Traffic Management	✓				✓			✓
AT – 04	Vienna	Traffic Information Pilot TIP	✓				✓	✓	✓	✓
AT – 05	Vienna	Traffic telematics Field Trial TTFT	✓				✓	✓	✓	✓
BE – 01	Belgium	Colruyt	✓					✓	✓	
BE – 02	Belgium	CRP Delhaize	✓					✓	✓	
CH – 01	Switzerland	LSVA	✓				✓		✓	✓
CZ – 01	Brno	Road Traffic Protection System for Pedestrian Zone	✓				✓	✓		✓
DE – 01	Munich	VMTL	✓					✓	✓	
DE – 02	Stuttgart	MOSCA	✓					✓	✓	✓
ES – 01	Seville	MEROPE	✓				✓		✓	✓
FR – 01	Paris Region	DISTRIPANNER	✓					✓	✓	
FR – 02	Rouen	Intelligent Truck Management	✓				✓	✓	✓	
GR – 01	Greater Athens	Attiki Odos Motorway	✓				✓			✓
GR – 02	Greater Attica	Fleet Management System	✓					✓	✓	
HUN – 01	Debrecen	Traffic control centre (DEKIR)	✓				✓			✓
HUN – 02	Budapest	TOPCITY	✓				✓		✓	
HUN – 03	Hungary	Commercial Vehicle Fleet Management System	✓					✓	✓	
IT – 01	Rome	INTEGRAL Roma	✓				✓	✓	✓	✓

IT – 02	Genoa	M.E.R.Ci.	✓				✓	✓	✓	✓
Country	City/Region	Name of project	Affected Transport Mode				Kind of Application		User Group	
			road	rail	Inland shipping	Combined	Traffic management	Operational private	private	public
JP – 01	Japan	VICS	✓				✓	✓	✓	
NL – 01	Eindhoven	Kenniswijk (eDrul)	✓					✓	✓	✓
PL – 01	Poland	Intelligent System of Freight Collection and Delivery	✓					✓	✓	
SK – 01	Bratislava	Fleet management	✓					✓	✓	
SK – 02	Kosice	Management Information System	✓				✓			✓
SK – 03	Zilina	Management Information System	✓				✓			✓
SLO – 01	Maribor	Electronic management of (city centre) freight/parking zone	✓				✓			✓
SLO – 02	Slovenia	Talk Track	✓					✓	✓	
UK – 01	York	UTMC29	✓				✓		✓	✓
UK – 02	Avon	Traffic Management System	✓				✓		✓	✓

Assessment of the  
projects

The following project descriptions show examples of planned or implemented ITS solutions and assess the experiences made. As many innovative projects are planned or set-up a selection had to be made.

Thereby, the following aspects were considered:

- Relevance for BESTUFS, innovative character and contribution to solve problems
- Success / failure analysis and real world experiences
- Balance among countries and approaches
- Availability of further information
- Coverage by other EU-research projects



Example 8.7.1:  
Traffic Information  
Pilot – TIP

### **Example 8.7.1: Traffic Information Pilot Vienna (Austria)**

[Schrampf 2003]

#### **Key words**

**Satellite navigation, integrated traffic management, route planning**

Description:  
Reasons,  
Framework  
conditions

TIP is a pilot for an integrated traffic management and information service for the region of Vienna based on EGNOS (GALILEO) which was initiated by the Austrian Research Center Seibersdorf and TecNetCluster Vienna in 2001.

Objectives

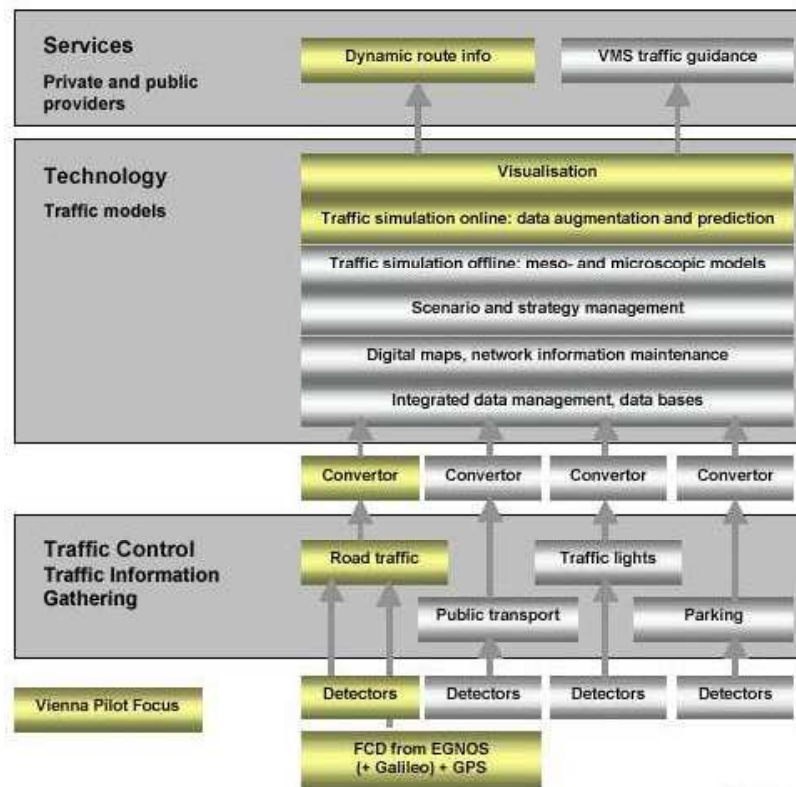
The system offers data and services which has relevance for urban freight transport. With satellite navigation real-time fleet operation and route-planning could be possible for urban distribution. The idea is to create an open source model where users can easily profit from services by implementing simple application. Relevance of this project for BESTUFS is quite high, but the project itself seems to be deadlocked for a while, as no further information is available. Traffic control systems are generating data with satellite technology (GALILEO). Different ITS-tools and technologies prepares the data for traffic management and operational systems.

Basic approach

Parts of the concepts are:

- general traffic information
- jam warning
- optimised route planning

The main modules of the system are shown in the figure below:



**Figure 109: Traffic management system**

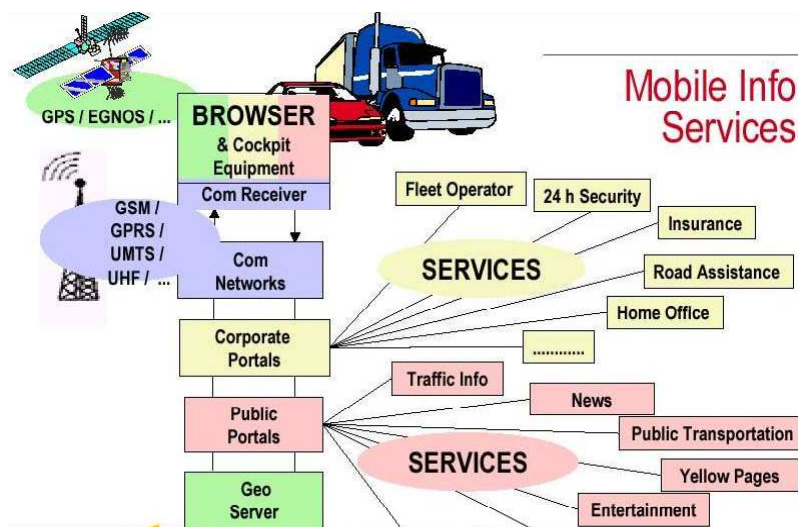
[Source: Presentation “Vienna Pilot” at the partnering meeting on “Intelligent transport systems and services”, 18.06.2001; available on: [http://www.arcs.ac.at/space/events/vienna\\_pilot2.html](http://www.arcs.ac.at/space/events/vienna_pilot2.html)]

Results and Experiences

The project is still in progress therefore no results are available at the moment.

Future plans / Development

The project is strongly depending on the development of the GALILEO-project. Further services and applications are planned like shown in the figure below:



**Figure 110: Mobile Info Services**

[Source: Presentation “Vienna Pilot” at the partnering meeting on “Intelligent transport systems and services”, 18.06.2001; available on:

[http://www.arcs.ac.at/space/events/vienna\\_pilot2.html](http://www.arcs.ac.at/space/events/vienna_pilot2.html)]

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Example 8.7.2:  
MOSCA

### Example 8.7.2: MOSCA (Germany)



[Glücker 2003]

#### Key words

**Information platform, time windows, route planning, delivery time planning, door-to-door-delivery**

Description:  
Reasons,  
Framework  
conditions

Decision Support System For Integrated Door-To-Door Delivery: Planning and Control in Logistic Chains (MOSCA). MOSCA provides a set of computer tools to assist the transport operators in planning their transport services.

Objectives

The key objective of the MOSCA project is to provide a set of tools for improving the efficiency of door-to-door transport of goods in urban areas.

Basic approach

The approach integrates the urban goods flows and their related infrastructure within advanced urban transport models allowing authorities to plan, assess and control freight transport according to their needs. Private transport operators take advantage out of the model by accessing actual traffic and other information (e.g. “works ahead” on roads or closed lanes) but also out of other advanced possibilities for an improvement of their knowledge like e.g. the delivery time windows of their clients.

Two of these modules have been tested at the German test region Stuttgart:

The MOSCA-SHOP module represents an information platform which allows on one hand the integration of loading and unloading time windows of shops and additional information relevant for goods transports via an open “shop-owner” Internet user interface. On the other side time slots (defined according to these information) can be booked by transport operators via the “operator” internet user interface. An interface to tour planning tools is foreseen.

The MOSCA-NET module is also an information platform. It offers an Internet user interface where citizens/customers can integrate their personal time patterns and get information with regard to the status of their orders. The authorised delivery services get access to the time patterns for a better planning of their delivery tours.

The MOSCA-SHOP module provides information on free dock access and allows booking of access time slots. It is used by carriers to plan their service anticipating waiting time at the shops loading dock. On the input side the carrier enters requests for dock access bookings. Shops give their accessibility information and instructions for carriers to MOSCA-SHOP. MOSCA-SHOP is auctioning these timeslots through a so-called “Dutch-auction” in which the values of the corresponding access time slots decrease

the closer the time gets to the actual delivery time. By doing so carriers can virtually “buy” safety by booking time slots sooner than before.

The MOSCA-NET belongs to the carrier-customer collaboration category. It receives information about delivery locations, delivery profiles and time windows from B2C, i.e. private customers.

#### **Testing of MOSCA-SHOP in the city of Stuttgart:**

Information on the ramp access situation of shops in the city centre of Stuttgart have been collected in order to assess on one hand side the general ramp access situation in the city centre of Stuttgart and on the other side to find out the reaction of shops with regard to the “dissemination” of these information. It can be concluded that the stores’ willingness to provide any information about the prevailing delivery situation has to be judged as being rather low.

The data of the shops (opening times, capacity, average duration of loading and unloading, average number of arrivals per day) were integrated in the MOSCA-SHOP data base via the MOSCA-SHOP web page. A real auctioning of time slices could not be realised within the project.

*The following conclusions can be drawn for MOSCA-SHOP:*

- The stores’ willingness to provide any information about the prevailing delivery situation has to be judged as being rather low.
- The integration of the data of the shops in the developed user interface is possible without any problems.
- The auctioning (from the transport operators’ side) could not be tested. But the internal discussion of the concept showed that the implemented Dutch-auction might have to be replaced by another auction concept.
- The solution can be extended to a general parking booking system for commercial vehicles (this was tested in the MOSCA test site Lugano).
- Final conclusion: the technical solution is available but the use of the system and the possible positive effects depend heavily on the user acceptance (in this cases shops).

#### **Testing of MOSCA-NET in the city of Stuttgart:**

For a reasonable generation of time patterns, groups with homogeneous behaviour in Stuttgart, as they exist in the traffic model (MobilistNet), have been analysed. The potential delivery locations “at home”, “work place”, “service station” and “pick-point” (public transports) have been considered and according addresses in the Stuttgart area have been selected. The addresses have been derived from a city plan where the spatial repartition of the delivery locations has especially been taken into consideration.

*The following conclusions can be drawn for MOSCA-SHOP:*

The active tests showed that people seem to be reluctant to specify time-patterns for more than one week. The problem is to commit oneself to specific time patterns as the exact course of the day cannot always be planned ahead. A backup address like a pick-point or a service station where the goods could be delivered to would be ideal.

The delivery addresses allow to reach the customer for 5 up to 21 hours a day, requiring a 24 hours a day commitment from the parcel services. This number of hours when the customer can be reached decreases considerably when the parcel service's usual operating times are born in mind. This also shows the great advantages pick-points or service stations can provide as delivery stations.

Final conclusion: the technical solution is available but the use of the system and the possible positive effects depend heavily on the user acceptance (in this cases private customers).

Future plans /  
Development

For MOSCA-SHOP the work also focused on a first example realised within the MOSCA project. The next step will be to go towards a first scientific prototype. The intention is to promote the underlying ideas and create a wider awareness for both problem and solution approach.

For MOSCA-NET the work focused on a first example realised within the MOSCA project. The next step will be to go towards a first scientific prototype which allows further extensions. Further research necessary in order to create a fully featured decision tool.

More information

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General project information:

[www.idsia.ch/mosca](http://www.idsia.ch/mosca)

Internet pages of the two modules:

<http://mosca.ifl.uni-karlsruhe.de:8080/MOSCANET/index.php>

[http://mosca.ifl.uni-karlsruhe.de/shop\\_index](http://mosca.ifl.uni-karlsruhe.de/shop_index)

Example 8.7.3:  
Kenniswijk

### Example 8.7.3: eDRUL (Netherlands)

[Schoemaker 2003]

#### Key words

**Tracking and tracing; Pick up-points; e-commerce; city distribution;**

Description:  
Reasons,  
Framework  
conditions

Kenniswijk is an initiative of the Dutch Ministry of Transport to stimulate the development of ICT services and facilities for the consumer. The Kenniswijk region includes districts of the municipalities of Eindhoven and Helmond. The Kenniswijk has about 38000 households and 84000 inhabitants. The whole Eindhoven region has a population of more than 700000 inhabitants.

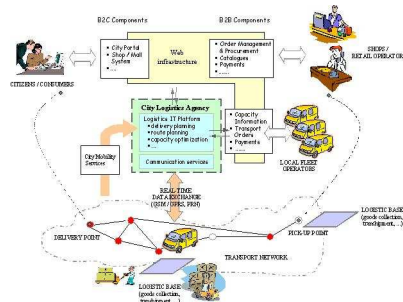
The urban distribution concept in Kenniswijk is the eDRUL project. eDRUL – *eCommerce Enabled, Demand Responsive Urban Logistics* – is a research and innovation project in the field of e-logistics.

eDRUL will pilot innovative urban freight distribution schemes, advanced IT solutions and integration with e-Commerce / e-Business infrastructures allowing on-demand planning of the distribution of goods. eDRUL has chosen to start a pilot with goods pick-up points operated by Kiala. Kiala offers a network of pick-up points for urban distribution.

Based on the general concept and e-logistics architecture developed in the project, eDRUL in The Netherlands will concentrate on analysis and optimal definition of cooperative (multi operator) demand driven urban logistics scenarios. This will be achieved through the trial of simulation and planning services for matching supply and demand of goods in a representative test area. City distribution projects are running in several cities in the country. The suitability and availability of a proper site for eDRUL in The Netherlands is guaranteed by the participation of the Dutch National logistic freight distribution Agency (PSD, Platform City Distribution) to the eDRUL Consortium in first instance. After consideration, Kenniswijk Eindhoven has been chosen as the most suitable site for eDRUL.

The implementation of the eDRUL architecture involves a number of advanced ITS applications and enabling technologies, including:

- web-enabled information and booking services for the customers (B2C segment), information exchange, resource sharing for e-logistics operators (B2B segment);
- delivery notification and information through mobile phones and SMS;
- goods dispatching software for trip planning and resource (i.e. vehicle capacity) optimisation;
- in-vehicle display units and hand-held devices (palmtops, PDAs, new generation mobile phones based on WAP and GPRS) to support vehicle drivers and goods delivery operators tasks;
- GPS-based or GSM/GPRS-based vehicle location systems;
- long-range, wireless communications (GSM, GPRS) to support interactions and information exchange among the logistics planning/management platform and vehicles/goods delivery operators.



**Figure 111: eDRUL Reference Architecture**

**Objectives** The purpose of the collaboration between eDRUL and Kiala is to develop, implement, test and evaluate solutions for city distribution and delivery points for consumers and SME's.

**Basic approach** Consumers can choose to have goods that they have ordered on-line or through a catalogue shop delivered at Kiala pick-up points. The entire process from order through pick up by the consumer is supported and monitored by ICT systems. The systems used are tracking and tracing (available to the consumer) in combination with bar code scanning technology. The whole system is 'paperless". The Kiala points are always existing commercial enterprises, such as supermarkets, gas stations or tobacco shops. The main focus of Kiala are the large shops in the business-to-customer market, but within the eDRUL project this service is extended to proximity shops and customer-to-customer delivery through online auctions like eBay.

The success factors of the Kiala company in general are:

- Using existing infrastructure
- The participation of a large investors
- Low barriers in using the service
- Independence of the company

**Results and Experiences** The perceived benefits of the last mile solution are:

- Direct cost reductions in the logistic chain.
- Directly related to these cost reductions are external benefits, such as improved safety and reduction of congestion, emissions and noise.
- Increased freedom and flexibility for consumers: the consumer can choose the pick-up location and has a wide time frame to pick up the goods.
- Promotion of proximity shopping.

The entire process from order until pick-up is supported monitored by ICT solutions and solves problems with the last mile delivery for the B2C market.

**Future plans /** As the co-operation between Kiala and eDRUL in Kenniswijk hasn't started



Development                      yet, no results are available.

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Example 8.7.4:  
Genoa

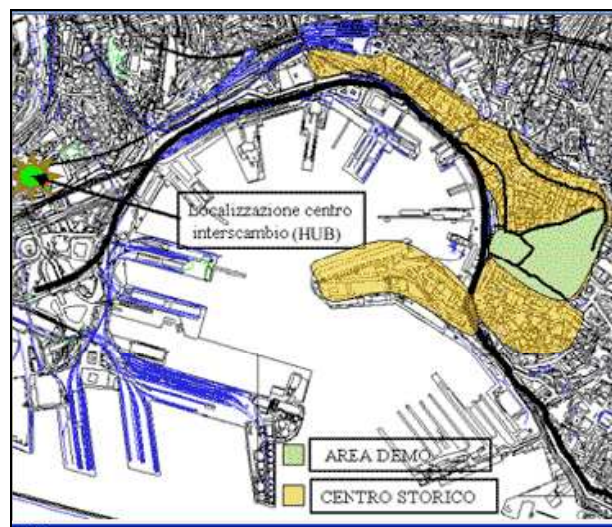
**Example 8.7.4: M.E.R.ci (Italy)**  
[Ruberti 2003]

**Key words**

**Stock management, delivery management, route planning**

Description:  
Reasons,  
Framework  
conditions

The M.E.R.Ci. Project consists of a Freight Distribution System based on the use of vehicles of no or low environmental impact controlled by an interchange centre (hub). This interchange centre will collect freight to be delivered to the city centre, which will be finally forwarded by means of environmental friendly vehicles.



**Figure 112: Part of Genoa City Centre**

Objectives

This project is aimed at: decreasing pollution and congestion in the urban area involved by implementing an urban interchange platform to start a mode exchange system with small size electrical and natural gas vehicles of ideal load capacity. The project is based on a sophisticated telematics management system; other towns, such as Turin, Rome and Naples are equipped with telematics systems for the management of the urban traffic which can also be used, as in Genoa, for urban freight distribution.

Basic approach

The functional architecture developed for the “M.E.R.Ci. Project” is based on several integrated subsystems:

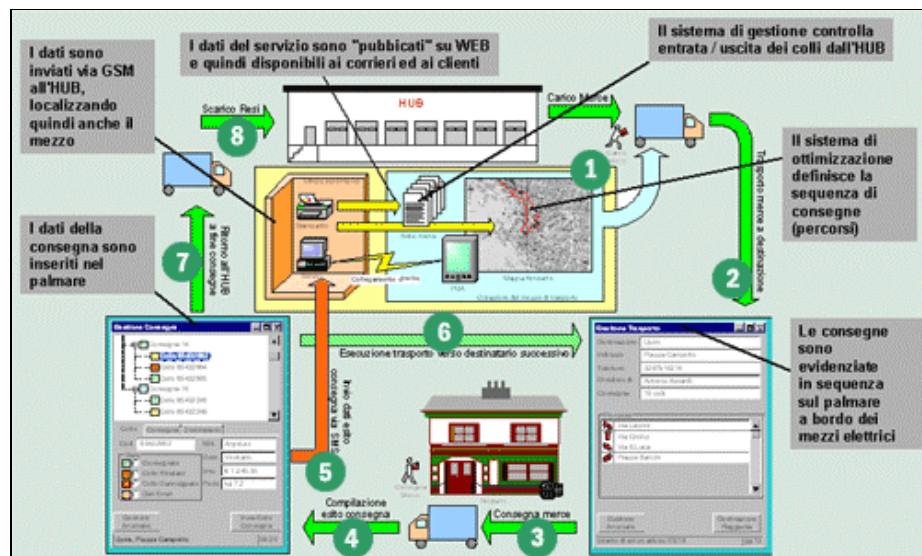
- stock management subsystem in multistock mode
- subsystem to optimise logistic services
- subsystem for the management of communication and information services via the WEB
- subsystem for the management of external communication via

PDA/GSM (mobile equipment)

- reporting subsystem
- safety subsystem

The System ensures the following three main functions:

- stock management (incoming and outgoing packages), organisation of the service, issuing on the WEB (different “subscriber” users)
- optimised planning of package delivery operations (selection of vehicles, sequence, tracking)
- real-time check of the delivery operations



The GSM Services control communications between the ecological vehicle travelling in the City Centre and the Central System, by transferring data under the form of SMS rungs between the Palmtop Computers of the delivery personnel and the central system.

The technical architecture of the System envisages that the communication between the users and the system take place through the WEB technology, and in particular:

- the internal users (operators, managers, supervisors) will have access to the functions of the System via the intranet network
- the external users (forwarding agents, storekeepers) will have access to the system through the Internet, i.e. by addressing the WEB site specifically created to issue the planned information services.

The second type of user will benefit from:

- WEB services for the forwarding agent: access to all the data concerning the packages delivered by the same to the hub and for each package the status of the delivery in progress (in stock, onboard the vehicle, delivered) at the time of the inquiry.
- WEB Services for the storekeeper: possibility of displaying the status of the delivery in progress for the packages to be delivered to the store (in

stock, onboard vehicle).

Results and  
Experiences

Project Phase

Future plans /  
Development

Before implementing the final project concerning the whole city centre, a demo project will be started for a part of it, known as "Demo Area".

More information

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Example 8.7.5:  
Hungary,

### **Example 8.7.5: Commercial Vehicle Fleet Management System (Hungary)**

**Key words**

**Fleet management, on-board information, route planning**

Description,  
Reasons,  
Framework  
conditions

This system integrates the capabilities of recent mobile telecommunication and the sensory and data measurement systems on the vehicle into a unified framework and has the feature of maintaining a permanent communication among the data acquisition and control modules allocated on the vehicles of transportation companies. It can also supervise and control the transportation processes, assist the driver in decision making, support the co-ordination of transport activities, and provides an information database for all participants possessing the particular unit on the vehicle.

Objectives

The main objectives of the project are the elaboration of the theory and methods of intelligent supervision, control and communication systems installed on vehicles, and an associated information service system for fleet management. The development of the information service as part of the fleet management system that collects, analyses and evaluates data sent by individual vehicles extends the utility of the installed vehicle systems and represents a significant added value to its application. The main tasks in cargo transport systems are to monitor the technical conditions of the vehicle and schedule the maintenance, the fast and safe delivery of the cargo, to increase the driving safety of vehicles, to decrease the load of the vehicle by specifying the most suitable routes and by the dynamic modification of the routes planned, and to increase the efficiency of all activities related to the transportation.

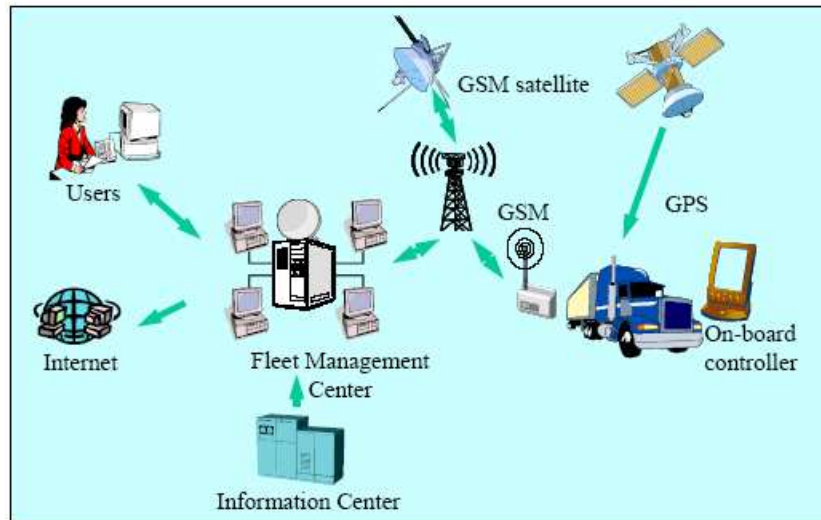
Basic approach

The system to be developed will be co-ordinated among three main parties as it is illustrated in Figure 1. One of them is the vehicle whose states of motion and cargo, road or traffic information can be downloaded either off-line, either on-line, depending on the later use of the data. The second is the fleet management center that evaluates these data, communicates them to the owner and, if necessary, based on the confirmative action of the vehicle owners, supervises the vehicle control systems. The third party includes the users (fleet or vehicle owners) who are interested in having the information provided locally on-line about certain traffic situations or road conditions.

#### **The control and communication unit installed on vehicles**

The on-board vehicle unit has been developed by using two methods. Firstly, a commercial measurement and mobile data communication unit has been adapted to the vehicle in order to collect and process the available signals and send the results to the fleet management center by using various communication technologies. Secondly, the vehicle unit with an up-to-date architecture has also been developed in order to test new ideas and functions which require research and development, and which can be used as a basis for new vehicle products.

**Figure 113: Control and communication system**



The fundamental functions of the mobile unit installed on vehicle are data acquisition from on-board sensors, gathering, pre-processing, and storing these data, sending information to the fleet management center, and carrying out commands from the center. All of the sensors and the on-board units are connected to a local network, thus the course features become accessible. A microprocessor-based unit carries out the processing of the measured data. Preprocessing means extracting and compressing important information from the sensor data. The unit is also responsible for sending information to the center by mobile communication. The vehicle unit consists of three layers.

- All the signals of the on-board sensors are accessible through an interface of the local network.
- The vehicle unit ensures connection between the communication subsystem and the local network. The tasks of the central unit are as follows: it collects sensor data, after pre-processing it sends them to the communication subsystem; it receives the commands of the fleet management center or of the driver, and forwards them to the local network; it carries out black-box functions; displays the course features and instructions of the fleet management center for the driver. These functions are reconfigurable, changeable from the fleet management center as well.
- The communication system is in connection with the fleet management center.

The new architecture has been developed in an embedded board computer system that can serve as a basis for experiments and tests for intelligent vehicle control tasks, in which flexibility, convenient re-configurability have got a great significance. This computer system has been realized by a compact, low consumption, robust embedded industrial computer with an embedded operational system (Embedded Windows NT/XP/CE, QNX, Linux). The vehicle unit also includes a smart sensor system which communicates on standard interfaces, internal sensors, GPS, camera, and

local/wide range wireless digital communication possibilities, e.g. Bluetooth, WLAN, GSM SMS, GPRS.

The new functions that have been implemented in the vehicle unit include environment mapping for the prevention of unintended lane departures to avoid obstacles; high precision positioning and navigation; system to identify unknown or uncertain parameters; control functions to solve the tracking and stability problem; increasing reliability by fault tolerant control, fault detection and diagnostics; and the basic functions of the unmanned operation (IUV: Intelligent Unmanned Vehicles).

### **The fleet management server**

The fleet management center as a processing-evaluating computer has a two-way connection with all of the vehicles and their owners. It receives the packages of data from vehicles, processes them and sends the requested information to the firms and, if necessary, sends information back to the vehicles. The server is in contact with other organizations (e.g. meteorological institutes, road maintenance companies) to which it provides useful information. Other subscribers, e.g. passenger transport firms, cannot send data to the server, since they do not have any communication unit on their vehicle, but they can request management services. Several communication accessibilities have been implemented in the server center: a communication interface to guarantee stable and continuous contact with vehicles; a company communication interface to provide access to the incoming detailed information for the management; contact with other subscribers to get information from the environment, and a public access displayed on an Internet-site. By applying this modern architecture, the fleet management center has been developed in such a way that it guarantees the communication and management functions available in the vehicle industry and it provides a possibility to modify the existing functions or add new functions to the server functions.

The user connects to the fleet management center through a general web browser running under an arbitrary operating system. Every user action and request is received by the web server, which is a Java middleware web container. This component constructs a dynamic HTML page with the responses of the center using the information in the database and/or activating the appropriate functional server tasks. The information about the vehicles (position, velocity, etc.) and the environment (roads, traffic, etc.) is provided by the vehicle on-board units and is sent to the center on-line in SMS or GPRS message format or off-line from the depot via the Internet. The properties of the server architecture are as following:

- The security of the stored and exchanged information is guaranteed by the strict rules
- of the safety management of the database handler and Java environment.
- As a result of the database-centered architecture, the servers can be developed independently on arbitrary platforms by different groups and the updated modules can be inserted into the system without interrupting the operation. In the case of increasing demands, the modules of the center can be easily multiplied.
- Every user has an individual web interface, which contains the services the user needs or has subscribed to.

### **Services provided by the fleet management system**

It is more profitable for the operators and fleet owners to use only the services that are absolutely necessary for them, therefore, they are given the possibility to choose various software packages for solving various problems. Moreover, there is no need for buying their own central server system, since by connecting to the central server at the headquarters, all services will be available. According to the above, six packages will be designed: basic, safety, diagnostics, financial, consignment-safety and administration packages.

More information

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Project leader: Prof. József BOKOR

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Example 8.7.6:  
Germany

### Example 8.7.6: VMTL (Germany)



[Marcel Huschebeck 2003]

#### Key words

**Dynamic trip planning, traffic management, traffic safety, traffic flow optimisation**

Basic approach,  
initiation

In the future, new technologies will help to avoid accidents and reduce congestion. By a fusion of traffic, information, and communication technologies, new assistance systems will emerge, capable of providing continuous support to drivers, determining the best route, and, in critical situations, even saving lives. Cars will inter-communicate automatically and warn one another of dangerous incidents or conditions ahead. Results of congestion research will allow traffic management systems to dissolve or even entirely prevent congestion. This requires the concerted co-operation of leaders in science, industry, and politics as achieved in the research initiative INVENT.

Planning and management capabilities should be designed and optimised with a precision extending to the exact street address. To this end, recent developments and opportunities for utilisation of public mobile communication networks and intelligent delivery route planning tools are to be investigated.

Background

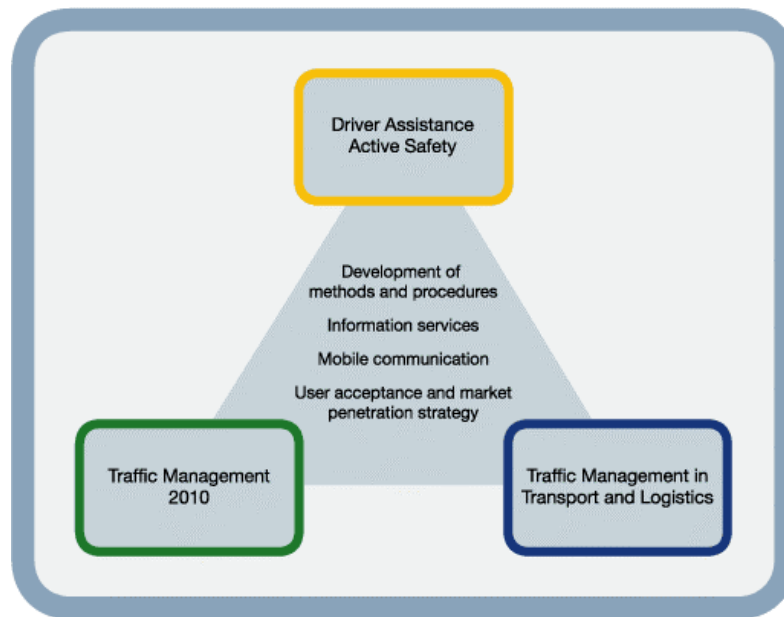
In order to implement the intelligent cars and the intelligent traffic networks of the future as soon as possible, 23 companies and institutions including automobile manufacturers and suppliers, electronics, telecommunications and information technology companies, logistics service providers, software developers, and research institutes, are working together hand in hand. The co-operation is organised into three projects focusing on safety, traffic management, and logistics. These projects include eight component projects. The project dealing with logistics is called VMTL.

About forty percent of traffic in metropolitan areas is generated by pick-ups and deliveries. The tendency is toward a steady proliferation of individual deliveries as internet orders increase. Specialists are investigating how to plan routes dynamically for delivery vehicles down to the house number - by means of modern mobile radio systems using real-time traffic data. This research could make logistics more efficient and customer-friendly and reduce environment impacts. For example, the delivery service will be capable of predicting the duration of the trip with high precision, and hence when the customer can expect the goods to arrive. The innovative logistics solutions will also pave the way for new services and logistics concepts

Core of the VMTL demonstration is the integration of a dynamic trip planning application considering traffic information on the one side and considering

customer individual information related to the delivery process.

**Figure 114: Structure of the INVENT project**

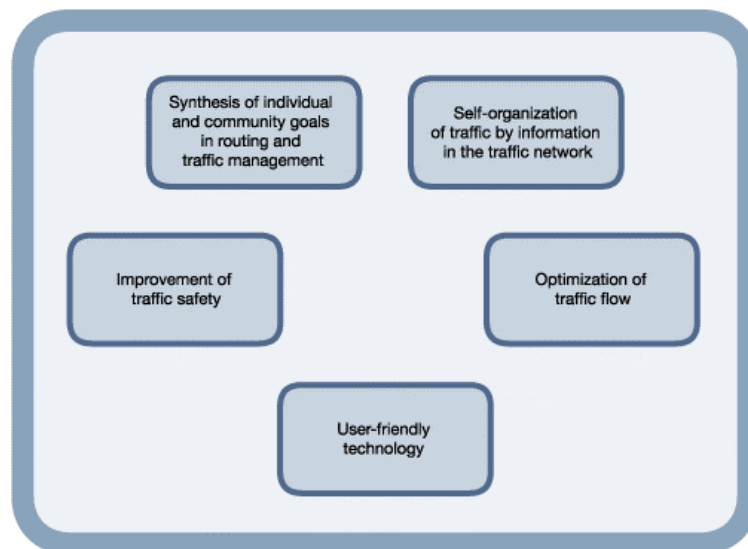


Source: <http://www.invent-online.de/en/goals.html>

Objectives

The goal of the project Traffic Management in Transport and Logistics is to investigate how existing and emerging information and communication technologies can be used to manage the flux of transported goods more efficiently and thus to reduce traffic demand.

**Figure 115: Goals of the INVENT project**



Source: <http://www.invent-online.de/en/goals.html>

In classical static delivery route planning, the only aspect of the three key factors (customer, vehicle, and roadway network) taken into account is the set of transport orders. The vehicles execute their delivery route plan without the slightest feedback, and the only available attributes of the traffic network are heuristics based on experience and historical data. Any attempt to make this process dynamic constitutes an intervention in the optimisation of this fixed logistic procedure. Achieving the desired flexibility by dynamic processing poses rather severe technical challenges for planning, communication and vehicle systems. The VMTL partners are determined to meet these challenges. In general, the project distinguishes two planning horizons: The first scenario – Scenario 2005 – takes existing technologies into account that could be available within a short time for a product solution. In contrast, the second scenario – Scenario 2010 – pursues more visionary ideas and incorporates technical options that are expected to be available within a few years.

In distribution systems, there are a large number of actors, including the sender, the recipient, the logistics company, and the fleet operator, whose various requirements must be taken into account. The evolution of the current traffic state also plays an important role in optimising dynamical delivery route planning.

For these reasons, the project will adapt known tools for process model creation to the special requirements of the logistics sector. Using the process model, interactions and information flows between the actors can be represented and visualized. In addition, it will be possible to simulate individual processes, and improve comparison of alternative solutions with respect to various criteria such as costs or efficiency of resource utilization.

For dynamic goods and delivery management, the various transport and logistic systems to be used require continuously updated information and forecasts concerning, e.g., traffic congestion, road construction, status of tour, or the availability of the recipient. The project partners will investigate which data needs to be provided and how best to provide it, and they will design and develop an appropriate information architecture for this purpose. In order for users to accept these new services, they must have confidence in the security of the system. For this reason, another important focus of the project concerns security of personal data, protection against unauthorized access and hacker attacks, and other security issues. A series of logistic solutions and software tools are being designed and implemented to support the planned services.

In mobile communication systems, radio transmission is the most costly and technologically limited resource. Restrictions can arise both on transmission capacity and on availability and quality of the network that is used. Such restrictions apply to second- (GSM) and third-generation mobile telecommunication systems (GPRS, UMTS) and also to communication via alternative transmission systems. These constraints need to be included in the design of services for mobile users or in the application of mobile fleet devices to problems such as obtaining information.

For this reason, the project will investigate how to design extended communication via third-generation telecommunication systems so as to provide the information required for improved transport management

effectively, reliably, and inexpensively. The investigations will also consider hybrid communication solutions (GSM and WLAN).

Future plans /  
Development

Open, not yet available

More information

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## 8.8 Synthesis from the case studies

Only few examples  
with focus on urban  
freight

The case studies show that there are existing examples which include the application of ITS in urban freight transport. Nevertheless the main fields of application are not only focused on urban space. So it was hard to find suitable examples which only are directly connected to city logistics.

Many are on a  
testing level

Many of the projects are actually not running in practice. Those projects are on the one hand research activities that are not completely finished and are on a testing level. The MOSCA project for example will in a next step develop the MOSCA-SHOP and the MOSCA-NET as a prototype. The same is valid for the M.E.R.C.I.-project which will run first as a demonstration project. The selected projects are mainly demonstration ones but those are projects which are innovative and represent ITS applications with direct focus to urban freight whereas the other collected projects following a general approach and which are not directly connected to urban freight.

Freight distribution  
a main activity

As seen from the case studies freight deliveries or freight distributions are areas of main activities within ITS applications in freight transport. The introduction of freight management applications by usage of ITS have direct impact on the operators usage. This telematics application can support to receive economic benefits by saving costs in distribution. On the other hand environmental benefits and traffic flow optimisation can be envisaged.

## 8.9 Conclusions and recommendations

### 8.9.1 Conclusions

Quite a lot of activities in ITS

There are quite a lot of activities regarding ITS. As the experts have stated the theme telematics in freight transport becomes more and more of interest. This can also be seen from research activities that took and take place on national and international level.

Especially private companies aim to optimise their costs and goods flows by using ITS-solutions. Furthermore ITS is used to optimize the service quality that plays an important role in the growing competition between logistics services.

Freight and fleet management systems are suitable to reduce costs and tracking and tracing could be used to get actually status information about freights' positioning and by that to plan the further production or distribution process within the logistics chain.

Further applications of private companies that are often used:

- route planning and route guidance systems
- navigation systems

Public authorities try to solve problems in traffic by the development of intelligent traffic management systems which are also of interest for urban freight activities. The main fields of activities that have been identified within the material collection are:

- traffic information
- traffic control and monitoring (e.g. TIP Vienna)
- ITS related to access management (e.g. Barcelona)
- ITS used for road pricing (e.g. Oslo Toll Ring)

ITS in connection with urban freight transport mostly not covered

The material collection has shown that different ITS-applications are used to solve inner-company efficiency problems and/or urban traffic problems. The main usage of ITS in urban transport is on a general level, meaning that it encompasses private transport as well as freight transport.

Telematics applications that only focus on urban goods transport are quite rare. But this must be seen with respect to the application: ITS is a comprehensive technology that can be used on a broader spatial level and for many purposes. It can be used between regions even for global logistics chains. And it can be used in combination for freight and passenger transport. It does for example make no sense to use a fleet management system only for city centres. Logistics processes are not ending at the cities' border. Complex traffic management systems for example are able to cover both, freight and passenger transport. It would be economically inefficient to use a complex traffic management system only for urban freight transport (e.g. Traffic Information Pilot – TIP- Vienna). Only if an ITS should solve a

specific freight transport problem, like for example an ITS-supported terminal management, the exclusively focus on goods transport makes sense.

Nevertheless there are examples given who deal with direct regard to urban freight transport. Especially freight deliveries or freight distribution are areas of ITS applications in freight transport. It supports private companies to obtain economic benefits and on the other hand helps to gain environmental benefits and traffic flow optimisation:

- M.E.R.Ci. Project - Freight Distribution System (Genoa)
- INTEGRAL (Rome)
- Access Management Barcelona (Best Practice Handbook Year 1)

Many best practices that have been collected are on a research and trial level and not completely introduced like for example the MOSCA project, the Traffic Information Pilot Vienna or eDRUL (Netherlands). But these projects are directly linked to the field of urban freight. The main fields of research have been traffic management systems and ITS for freight distribution (e-DRUL).

But as seen in Germany the research activities have been a basic precondition for the development of praxis applications that are now running.

NAS-countries:  
currently ITS has  
less importance,  
but is growing very  
fast

Comparing the activities in NAS-countries with those in West European countries it can be stated that the ITS-applications are rather rare. But as also seen importance of ITS is growing rapidly. The main applications of ITS in NAS-countries are the usage in road pricing for financing enormous investments in road infrastructure.

### 8.9.2 Recommendations

Recommendations  
on project / city  
level

The main problem in urban traffic is of course the individual passenger transport by cars. Nevertheless freight transport can have enormous impacts on urban quality of life. Especially noise emissions and exhaust gas emissions from trucks, mainly heavy trucks, cause problems. Furthermore security aspects, capacity problems in the road network and parking problems are caused by freight transport.

Freight operators are faced with economic disadvantages and losses in service quality as a result of congestion.

The main problem lies within the inner city area where problems in delivery occur. The population density and the shop dense in this area are normally the highest one of an urban area. Therefore this topic is one main problem to solve. Public supported projects therefore should have a focus on the main bottlenecks in cities. A clear identification of bottlenecks is necessary to steer investments and efforts most efficient.

Co-operation  
between different  
parties

Problems in transport and traffic management are very complex and require a comprehensive solution for the management of different kind of problems and impacts. Therefore authorities can not stand alone to find solutions for appropriate ITS solutions. In co-operation with different interest groups like for example shop owners and freight transport operators ITS applications should be integrated in urban freight transport policies. The cities authorities can provide data and application about the general traffic situation in town or introduce traffic flow management for freight movements by usage of telematics information and communication systems. For general traffic and especially for car users this function but the special expectations of freight operators and delivery points have to be taken into account.

Therefore public supported traffic management measures should correspond with the requirements of freight operators, which mean to integrate companies' interests. An efficient traffic management system has to cover all different interests, also from freight operators' side.

Research versus  
practical  
applications?

As seen a lot of research initiatives and projects have been carried out which have been or are supported by national and local authorities or from the European Union. The main research activities regarding ITS have taken place in the field of freight distribution or with focus on traffic management. But there are other fields that can be of future interest for ITS-applications in urban freight transport like:

- truck route signalisation
- the improvement in operations with loading units
- virtual freight distribution centres etc.

The main research activities took place with the intention to improve the



efficiency in freight transport and to raise security. But there are only less research activities that focus on the improvement of quality of life or environment. Future research activities in the field of ITS therefore should also take environmental aspects into account.

For the further development of successful operating ITS-applications the research activities should follow a practical approach. Germany has shown that former research activities have directly resulted into the practical development and implementation of telematics technologies and applications. This example shows that research can provide a clear benefit for the practical implementation and can create high acceptance.

From beginning on it is very important to involve many stakeholders in research activities. The private industry can contribute practical know-how and describe the requirements that are necessary for the future development of ITS-applications. Their interests should play an important role in the early stage of a research activity. But also the interests of the society and environmental aspects should be taken into account.

Consensual approach

Concepts should be developed and should contribute to an economic and consensual solution that would be well accepted among the users. So with respect to financial investments and time of planning the measures carried out by public authorities should be supported and checked from independent side. Because of high investments in telematics the approach should follow under participation of different interested parties.

NAS-countries have to be supported for further ITS-implementation

As seen from the material collection ITS in NAS-counties are in a developing stage. Further efforts have to be spent to solve the problem in urban road goods transport, but also in passenger transport. ITS can support to avoid negative impacts. National authorities and the EU should try to fund innovative ITS-projects. Furthermore it is important to co-operate with private enterprises to share the financial risk. An efficient engagement can be reached by identifying and evaluating cities which are faced with main problems in urban freight transport. A selective financial support can help to gain a return on invest. Learning lessons from West Europe and a narrow co-operation between towns from East and West Europe can be taken into account to avoid mistakes.

Knowledge gaps

Regarding the usage and testing of ITS in urban freight transport there are still existing knowledge gaps. Taking into account that main activities are with focus on traffic management systems it can be assumed that further applications are not taken into account and that there are still existing knowledge gaps in telematics applications in urban or regional freight transport. This is often in fact a result of the structure of local authorities. Often a department dealing with freight transport does not exist and mainly general traffic questions especially infrastructure planning is focused on. So the public authority has to be aware of existing knowledge gaps that exists with regard to urban freight transport.

## 9 Public Private Partnerships (PPP) in urban freight

### 9.1 Introduction

Why PPP ?

Public Private Partnerships (PPP in the following, sometimes also called 3P), the institutionalised collaboration of public and private actors, is not an innovation of today. Contractual PPP was used as early as 1834 with the development of the Suez Canal which was financed by European Capital with Egyptian financial support and had a concession to design, construct and operate assigned to the Egyptian ruler Pasha Muhammad Ali [Menheere et al. 1996]. Nevertheless, PPP has become a slogan in public discussions and Europe has seen a strong growth in PPPs in recent years. With the current concept of sustainability, consultation and participation of private actors in political decision making has become increasingly popular, particularly on the local and regional level. New Public Management approaches are opening up opportunities for private companies as there is a growing understanding that co-operation with private companies will help to improve efficiency faster and to ease the pressure on public budgets [Erlach 2002].

BESTUFS work-  
shop in Malaga

“Public Private Partnerships (PPP) enhancing urban goods transport” was the topic addressed by the successful 8<sup>th</sup> BESTUFS-workshop that took place in September 2002 in Malaga (Spain). Due to the positive response to the workshop and the lasting actuality of the issue it was decided to incorporate the topic “Public Private Partnership for urban freight” into the fourth Best Practise Handbook (2003) within the BESTUFS thematic network.

In the following some information is given in order to show the most important aspects of Public Private Partnerships, to have a common understanding of what is meant by “Public Private Partnerships” within the BESTUFS-thematic network and to highlight the focus of this Best Practice Handbook.

### 9.1.1 Definitions, classification and scope

No general definition

In international literature there is no general definition for PPP. For one speaker PPP can mean the simple informal communication between members of the public administration and private enterprises. For others PPPs are exclusively contractual arrangements between government and a private party for the provision of assets and the delivery of services that have been traditionally provided by the public sector (a notion close to that of privatisation). The PPP concepts presented at the BESTUFS workshop reflected this wide range of different forms of PPP applied in general as well as in the urban freight transport domain. Therefore, some definitions and a systematic classification are necessary in order to sketch the scope of different PPP-projects.

PPP as a blanket term

PPP is a blanket term covering many forms of co-operation between government institutions and private sector entities [Erlach 2002]. Yet all these different forms of PPP have one main idea in common: that public and private actors are different. Each of them disposes of comparative advantages in certain aspects whether it is information, managerial know-how, financial resources, etc. Within the partnership (which can be seen as a sort of institutional division of labour) each partner fulfils the tasks he is better at - resulting in a win-win situation.

Classification criteria

PPPs can be classified according to [Roggencamp 1999]:

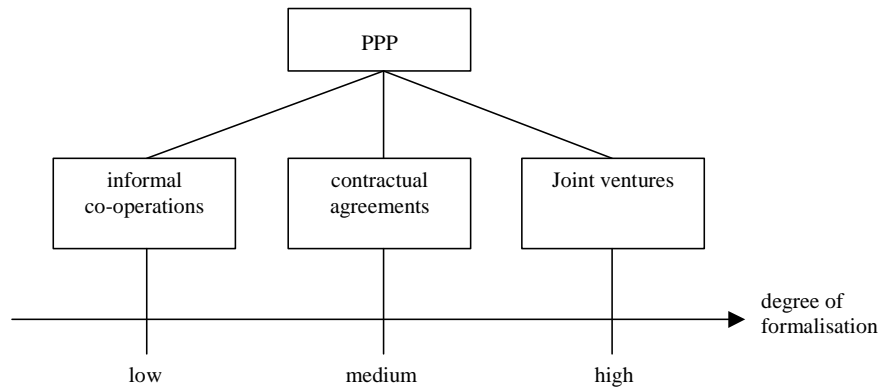
- their object (here: urban freight domain)
- the involved partners
- the degree of formalisation of the partnership
- the dimensions of the partnership

For defining the scope of this handbook particularly the last two criteria merit detailed attention.

Classification according to degree of formalisation

With respect to their **degree of formalisation** Heinz [1993] identifies three categories, although the differences are rather gradually than discrete (see Figure 116):

- informal co-operations
- contractual co-operations / agreements
- Joint venture companies with public and private shareholders/partners



**Figure 116: Forms of PPP and their degree of formalisation [Roggencamp 1999]**

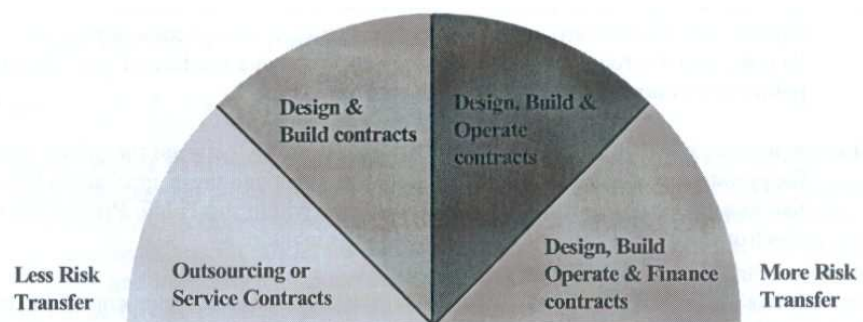
Informal co-operations

**Informal co-operations** (also called “handshake partnerships”) include informal discussions within specific projects as well as platforms and forums for a general exchange of information and experience, working groups and commissions on particular topics or thematic networks (such as BESTUFS). Many of these informal PPPs are not meant for implementing single projects but rather have a co-ordination and catalyst function. Stakeholders meet on a regular basis allowing their interests to be noted and eventual agreements to be reached. In Groningen (NL) for example, a communication process for urban transport issues has been started including an “advisory commission for distribution issues” that is acting as a sounding board for the city council [Kramer/Broersma 2002].

Contractual agreements

**Contractual agreements** are probably the most frequent (some would even say classic) form of PPP dating back centuries as shown with the example of the Suez canal. In these forms of PPP a public good is produced in co-operation between the public and private sector. This includes the subcontracting of governmental services or the financing and developing of public facilities to private undertakers, also referred to as “contracting out”. This form of PPP is particularly common in France, Canada and the UK, where over 100 deals have been closed for the construction of roads, railways, water and sewer systems, public buildings, etc. [PWC 2000]. An example of a contractual PPP in the freight transport domain is the agreement signed in 2001 between the Italian Ministry of Environment, the Italian Oil Union and the Fiat Group, committing each partner to selective tasks aiming at the increased diffusion of environmentally enhanced vehicles [Marchisio 2002].

Contractual forms of PPPs can be distinguished according to the extension of risk transferred from the public to the private sector (see Figure 117). Forms with little risk transfer include simple outsourcing of services such as catering and cleaning to achieve costs savings. Forms of higher risk transfer include Build, Operate and Transfer schemes (known as BOT) where the private sectors designs, finances, constructs and operates the facility and eventually, after a specified concession period, the ownership is transferred to the government. [Menheere et al. 1996]



**Figure 117: Contractual forms of PPP [PWC 2000]**

However, some contracting out agreements tend to resemble rather a pure customer-supplier contract than a partnership in its narrower sense. Some authors (e.g. Erlach 2002) therefore do exclude contracting out from their notion of PPP. We follow this perception by emphasising on dialogue structures rather than on purely contractual or financial agreements (see below).

Joint Ventures

**Joint ventures (JV)** are established where the public sector and the private sector wish to share the risks and rewards associated with a particular commercial enterprise, with each party undertaking the specific roles for which it has particular skills and expertise, thus a real partnership in its narrower sense. Across the world joint ventures between the public and the private sector are increasingly being used to help exploit the commercial potential of many public sector assets [PWC 2000]. In Terni (Italy) a logistics platform is being developed by the Region of Umbria that will be operated by a JV-company between the public (50%) and the local industry (50%) [Castellani 2002].

Classification according to dimensions (policy and operational)

A PPP can basically cover two dimensions: a policy dimension and an operational dimension [Roggencamp 1999]. While the policy dimension includes agreements on common objectives, decisions on measures and the

necessary resources, the operational dimension serves the pursuit of the policy and its implementation. The policy dimension might therefore be called the “soft” dimension in contrast to the rather “hard” operational dimension. The differentiation of these two dimensions follows the differentiation of “provision” and “production”. Public provision of a (public) good does not necessarily mean that it cannot be produced by the private sector, in the contrary, it might be a very efficient form of division of labour.

It is the fact that public and private partners are participating together in the policy dimension (even when only by exchanging information) that is characteristic for a PPP in its narrower sense, independent of the operational dimension that can be shared or treated by one sector exclusively (see Figure 118). Because the policy dimension lies on the strategic level, PPP is also referred to as inter-sectorial strategic alliance between private and public sector [Roggencamp 1999].

		Policy (“soft”) dimension		Operational (“hard”) dimension		
		Objectives	Decisions	Financing	Production	Management
Public Private Partnerships	Informal PPP	public & private (focus of this Handbook)		public and / or private (less focus of this Handbook)		
	Contractual PPP					
	Joint Ventures					

**Figure 118: Dimensions and organisational forms of PPPs**  
[Roggencamp 1999]

Focus of this Handbook

The integration of public and private partner into the policy dimension is the innovative aspect of PPPs compared to the commonly practised contracting out approach, where the public sector decides on the policy dimension (the quantity and quality of the good to be provided) and contracts the private sector for its production under given conditions. Therefore pure contracting out is often not considered as a form of PPP in the narrower sense.

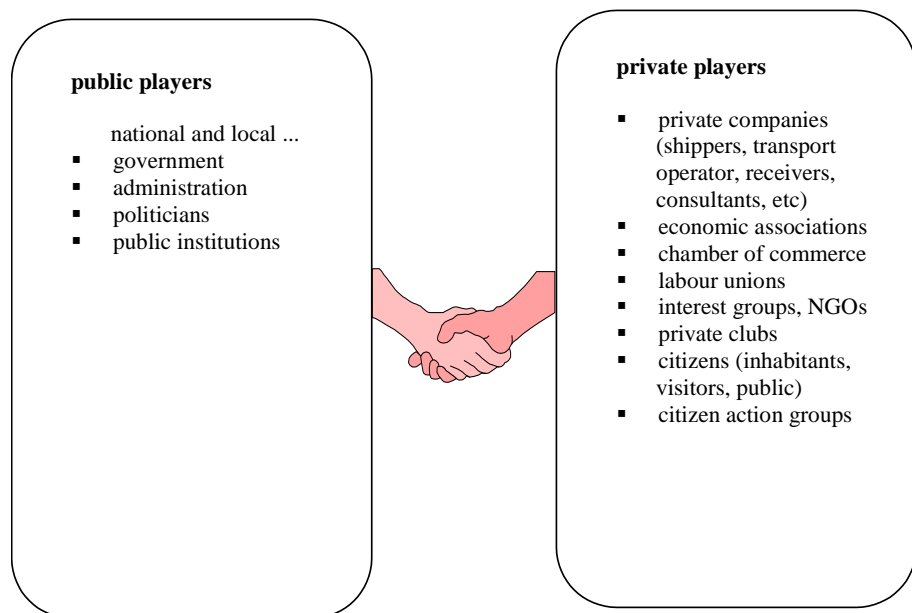
This Handbook follows this perception and focuses on Public Private Partnerships that cover the policy dimension (which might include contractual agreements too, see Figure 118). The emphasis is on the

dialogue between the public and private parties, i.e. on the “soft” aspects of partnership rather than the “hard” ones (financing, contracts, etc.). Yet, many PPPs will include both the policy and the operational dimension.

### 9.1.2 Players, incentives, opportunities and risks

Players = partners

Figure 119 shows possible public and private partners in the urban freight domain. Obviously their interests can be complementary as well as conflicting - depending on the particular issue.



**Figure 119: Possible PPP-Protagonists in urban freight [according to Balasko 2000]**

However conflicting their interests in some cases may be, the public as well as the private side has several incentives to join in a partnership [Roggencamp 1999, Balasko 2000].

Public incentives

**The public sector** gains access to corporate funding as well as to professional know-how, managerial expertise and labour capacity of the private economy. This enables the administration to concentrate on its core competencies and to increase the effectiveness and efficiency of their actions. A core aspect for joining a partnership with the private sector is the

reduction of uncertainty as the input from the private side provides local authorities with the level of knowledge required to implement complex measures and projects. For instance, the private side might act as a sounding board for policy initiatives providing the authorities with information on possible impacts of certain policy measures. The integration of all actors from the beginning of a project increases its acceptance thereby accelerating its implementation. Partners are mutually sensitised for the differing views and interests of the others. And a partnership allows to share the risk of developing and implementing a project among the partners. Finally, image gains and relation management with the private sector as a powerful stakeholder are not to be underestimated.

Private incentives

**The private partners** seek to make use of their assets in order to increase profits. A partnership with the public sector might offer them financial support, e.g. tax reductions or development funds. Close relations to politics and administration and access to public information channels can help them to accelerate planning procedures and project implementations, thereby hedging project risks. An active market player might even influence the market conditions (e.g. planning regulations) he is acting in: PPP offers private actors the possibility to influence external factors that play a significant role in the development of their companies and their markets, e.g. economical and social issues. Finally PPP gives private players the opportunity to improve their public relations and to share project risks among partners, just like for public players too.

Complementary and overlapping interests

This short overview on the interests of public and private players shows, that their objectives are complementary and partially overlapping, offering room for successful partnerships.

Opportunities and benefits

Thus, PPPs offer opportunities and benefits for all partners:

- synergy effects such as the mutual exchange of information and know-how
- effects of reciprocal learning such as a mutual understanding of the partner's mindset and action constraints

acceleration effects in developing and implementing a project (efficient division of labour and mutual reduction of resistance through integration of the opposite sector from the beginning).

For the public shareholder the following benefits can be taken as an example:

- access to corporate funding
- utilisation of private management expertise
- ability to concentrate on core competencies and



- increase of efficiency.

For private participation there are also important benefits that can be assumed like:

- PR and image gains
- Motivated and committed employees
- Improved access to public information channels and acceleration of planning procedures and project implementation
- Possibility to influence external factors that play a significant role in the development of the company, e.g. economical and social issues.

...problems and risks

However, as the partners have complementary but not identical interests, a PPP also implies risks - as does every partnership. Asymmetric information between the partners is a hindrance for establishing new partnerships (selection of trustworthy partners) and implies the risk of moral hazard<sup>63</sup> once the partnership is established. Furthermore, an actor's investment specific to the partnership reduces his independence and offers possibilities for free-riding to his partners (hold-up risk). Beside this the PPP does include the entrepreneurial risk which can be distinguished in an economical risk and a technological risk.

PPP allow the public sector to transfer certain risks (e.g. construction, financing, operating) to the private sector in exchange for a fee. At some point, where the uncertainty and risk for the private sector are too high, the fee becomes uneconomic for the public sector. The more optimal the risk allocation is for a project, the higher the overall value achieved.

An additional problem and risk can be seen in the often existing own interests of the public shareholder who is not aiming to share his responsibilities, tasks and competence with third parties. This constellation can hamper the project development and can lead to inefficiency during the PPP project process.

Barriers for the implementation of a PPP could often be the expensive preparation of the project (especially if a new company will be founded) and the requisite for the work out of complex regulations.

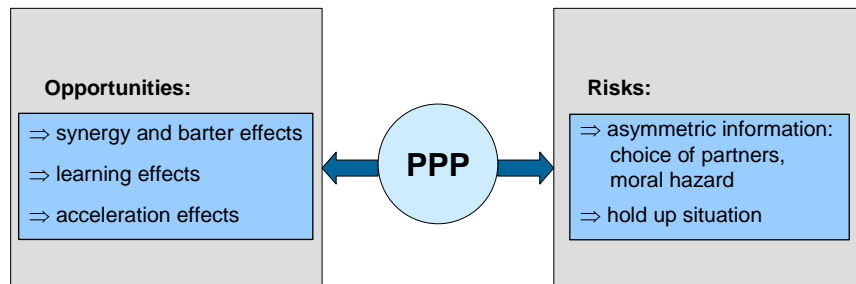
A further important obstacle can be seen in the complexity of co-ordination of PPPs and linked to this high transaction costs.

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<sup>63</sup> Moral hazard refers to a situation in which, after a contract or partnership is negotiated, asymmetric information enables one partner to mislead or trick the other partners in order to pursue his personal interests [see e.g. Milgrom/Roberts 1992].

About that there often no experiences in PPP are made. How to deal with PPP can therefore be a risk for public and private partners. If there is made no experience the potential partners desist from the realisation.

**Figure 120** gives an overview on opportunities and risks of PPPs.



**Figure 120: Opportunities and risks of a PPP**  
[according to Roggencamp 1999]

## 9.2 Related research activities

There are not many examples given which are dealing with Public Private Partnership in the area of research activities. This results of the kind of theme treated in this handbook. PPP is in general not appropriate for research purposes, because the private actors are only interested in if there is a profit situation for them. About that most of these activities in the field of PPP are appropriate to deal with practical approach and not on a theoretic level. The following European and national research projects related to Public Private Partnership have been identified:

European research projects:

**PROFIT** (<http://europa.eu.int/comm/transport/extra/profitia.html>): The objective of PROFIT was to help decision-makers assess whether or not public private partnerships (PPP) can offer an attractive option for successful and accelerated implementation of Trans-European network projects. Specific aims were:

- to provide a comprehensive methodological framework for assessing the PPP potential of a trans-European network project, based on financial attractiveness and socio-economic costs and benefits,
- to develop a practical and easy-to-use handbook for decision-makers which offers "quick scan" guidelines of the PPP potential of infrastructure projects.

The main project output is a handbook targeted at government officials involved in setting up or supervising PPPs to finance and operate trans-European network projects. The handbook is based on the development of an integrated socio-economic, financial and risk analysis framework.

The handbook gives a detailed description of how to organise the different phases of the PPP process:

- the tentative PPP exploration, to decide whether to initiate the process of developing a project on a PPP basis,
- the PPP preparation process, to decide whether the project's objectives meet the required PPP objectives,
- the tendering process and
- the PPP negotiation process with the preferred bidder.

Recommendations have been provided on how to avoid possible barriers pertaining to the regulatory framework, market and financial factors, and the political environment. A methodology (the PPC, "public private comparator") has been presented to enable decision-makers to compare PPP with conventional tendering for a specific project.

Three types of PPPs were found to be the most common for trans-European

network projects:

- joint ventures, where investment is shared between the public and the private sector,
- concessions, where investment is undertaken in full by the private sector through concession agreements,
- hybrid types, where the project is split into several project components with a public SPV ("special purpose vehicle") in control of the overall project.

Before the PROFIT project, an integrated framework for assessing the suitability of PPP schemes for trans-European network projects was lacking. PROFIT has made available the necessary guidance. The PROFIT methodology addresses the various aspects that should be taken into account when going through a PPP process in a logical order.

No national general  
research projects  
on Public Private  
Partnerships

Research activities in the field of PPP on a national level are not known because most projects on national level follow a more practical basic approach and have no focus on theoretical research objective.

### 9.3 Situation at country level

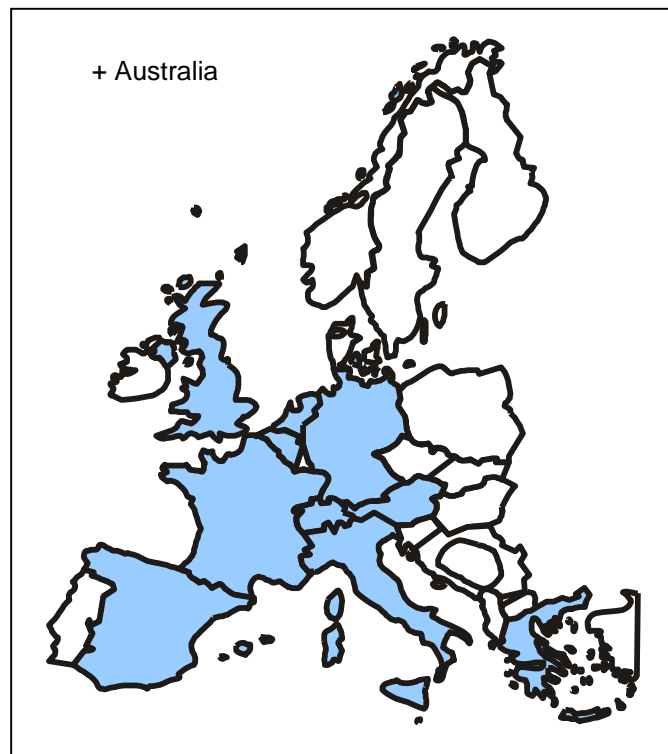
Fast changing information

Material regarding the situation of PPP in urban freight in general and of projects related to PPP in different European countries was collected by the various BESTUFS contractors and members. Further input came from the involved experts and the workshop held in Malaga. The following chapters summarise the main findings of the material collection on country and project level. The given information and its assessment represent the situation at the time of collecting the material, i.e. beginning of 2003.

11 countries represented

Material on 11 countries has been collected, covering most countries of the European Union except Portugal, Ireland, Luxembourg, Denmark, Sweden and Finland, plus Switzerland and Australia (see Figure 121). In the following an overview about the activities in different countries will be given. The focus is on the importance of PPP in the surveyed countries and the general situation within the countries.

A detailed report on each country's situation concerning PPP is given in Annex I.



### Figure 121: Countries covered by the material collection

#### 9.3.1 Importance of PPP for urban freight

In order to give a brief impression of the relevance of the topic PPP the BESTUFS partners participating in the material collection were asked to estimate the importance (or relevance) of PPP for urban freight in their country - in the past, nowadays and in the future. Although the term “importance” is defined rather vaguely and its estimation is always subject to the personal view of the assessor, a rough overview on their different estimations sketches a first picture of yesterdays’, nowadays and possibly tomorrows’ situation concerning PPP for urban freight in Europe.<sup>64</sup>

Increasing  
relevance

The following figure 9 shows the estimation of experts concerning the importance of PPP in urban freight transport. The experts have been asked to give a statement about the relevance of PPP appeared in the past, nowadays and expected in the future. The importance was scaled into a six-level evaluation scheme: Level zero means PPP has no importance, level one shows a very low importance, level two a lower one, level three a medium relevance, level four means high and level five gives the highest importance for PPP.

The analysis of the questioned importance shows that in most cases the experts saw a very low relevance of PPP in the past and against this a very high role of PPP in the nearer future. In figure 9 it is shown very clearly that PPP is a theme which will become more of interest in the future. Especially the bad economic situation of public authorities and new mechanism of financing comprehensive public projects will accelerate this development.

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<sup>64</sup> Please note that the considerations expressed in this chapter represent the personal opinions of the BESTUFS partners participating in the material collection and should not be mistaken as a statistical opinion poll.

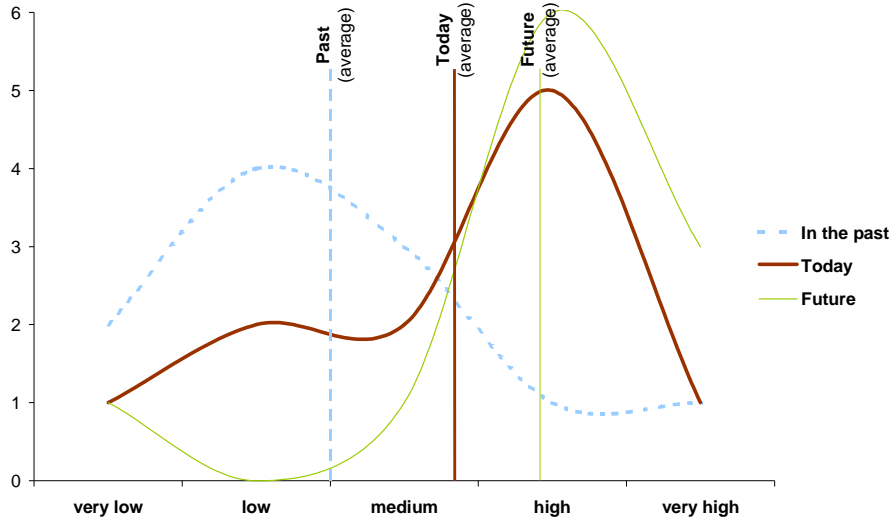


Figure 122: Past, nowadays and future importance of PPP for urban freight (number of countries)<sup>65</sup>

<sup>65</sup> According to the personal estimations of the BESTUFS members participating in the material collection

### 9.3.2 National situation regarding PPP

Summary of experiences:  
Limited number of PPP-examples in urban freight

In the following a summary of experiences from projects with application of PPP will be given. There are existing of course many various examples within the countries using PPP for developing, financing and operating projects. The different projects cover various measures with different approaches in the transport sector. But there are only a few examples given dealing with PPP in urban freight transport. Therefore often examples with generally regard to transport are given as example and not only with focus on urban freight transport. But in many countries are no examples given in the field of urban freight transport. Transport is a sector where PPP is often applied and mostly in context of financing motorways or other infrastructure projects.

Most PPP-projects are infrastructure investments (PFI – Public Finance Initiative)...

The involvement of private actors in the development of infrastructure projects was particularly welcome in the transportation domain, due to the significant capital investment required in such projects. Transport-related infrastructure and the respective public services provided, often require modernisation and a significant boost to their competitiveness. Because of the high investments a private operation by private investors is welcome. There are numerous huge projects where private actors financially are involved: e.g. the Austria Centre Vienna, the Athens airport project, the Oeresund Bridge (linkage between Denmark and Sweden) and many more examples from whole Europe.

...in urban freight transport are less PPP projects

Public Private Partnership in urban freight transport is mainly applied in form of dialog (informal PPP) between the official bodies and the private industry. Most PPP are contractual PPPs but this does of course include the informal approach of the co-operation. Especially in questions dealing with urban freight transport the local authorities are engaged to take advice and support from private actors like shippers, logistics services, haulage companies and consultants but this partnership shows only the character of a dialog and nothing more. The implementation of concepts and plans regarding urban freight transport are mostly in the responsibility of the official authorities. Only in case of a profit situation for private actors and a given win-win-situation for both parties the private side is interested in the operation of a concept. In case of the development and the construction of a logistics centre for example often private operators are willing to manage the operation.



History of PPP started in early nineties

In most countries the introduction of PPPs has been started in the beginning of the 1990s. The first stage of PPPs has been informal PPPs, where private industries, advisors, institutions and research agencies give support to local authorities. Most of these first projects have been the construction of motorways under the participation of private financiers. Official authorities have more and more seen that big infrastructure investments could not be done anymore without private investment capital, especially under the framework conditions of a worse becoming economical situation of municipalities and state administrations.

Motivation and approaches of PPP in urban freight transport

There have been existing different reasons for the motivation in setting up a PPP. One main reason can be seen in PPP as a solution in case of a widespread privatisation activity in many countries which started in the beginning of the early nineties.

At the beginning, as already mentioned, the motivation to launch PPP-enterprises was heavily focussed on the financing aspect. About that the local authorities have realised that nothing happens in the field of urban freight transport if there is no participation and support from the private actors. Knowledge and input from specialists of consulting and engineering companies, logistics services etc. became of more importance because the problems in urban areas have intensified since the mid 1980s. Above all this can be seen in the number of informal approach of PPPs (also in case of contractual PPPs), which are often represented within the best practice examples.

A further argument for establishing a PPP is to represent a way for harmonising conflicting interests among different stakeholders and to find an attractive solution for the stakeholders (possibly a win-win situation).

In the following we give a very brief summary on the national situation in the various countries (summarised in).<sup>66</sup>

Austria: most PPP are PFI (Private Finance Initiative)

In Austria most public-private co-operation projects were carried out in the field of communal infrastructure. Generally spoken, PPP has often been an emergency solution if there was no appropriate public financing solution. The general opinion was, that the official authorities are predominant in producing public goods.

Referring to the different dimensions of partnerships it can be stated, that the contractual agreement is still the predominant form in Austria, although this

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<sup>66</sup> A more detailed report on each country's situation concerning road pricing and urban freight transport is given in Annex I.

model is often not regarded as a PPP.

The dimensions that can be found often in Austria are:

- BOT (Build-Operate-Transfer)
- BROT (Build-Rent-Operate-Transfer)
- BOOT (Build-Own-Operate-Transfer)
- PFI (Private Finance Initiative)

Especially huge projects have been financed by PPP like the "Semmering-Basistunnel". Regarding PPP in urban freight transport there are not many examples given. There is only one big project example that can be named: the Cargo Center Graz (CCG).

Belgium: long tradition of partnerships between the public and private sector, but not in case of urban freight transport

Belgium has a long tradition of partnerships between the public and private sector. The central government (and the regional ones, after the creation of the regions) and the local authorities have set up such organisations for diverse reasons: industrial policy, financing to develop economies of scale or to share municipal activities. In the area of urban freight transport only one example for PPP is known (the morning market in Brussels).

Denmark: Very innovative in co-ordination of PPP-projects in different Danish cities

Denmark already started to develop a PPP in the field of urban freight transport issues in 1993. This PPP was a co-operation between the Danish Minister for Transport, the association Danske Fragtmaend and the Danish freight railway operator DSB Gods and aimed to create feasible solution models which would benefit the local environment and also accommodate the interests of the local authorities, carriers and traders.

Denmark is very innovative to set up PPP-projects in the field of urban freight transport and to co-ordinate different activities in different cities with various approaches. In 2001 the Forum for City Logistics was founded which co-ordinates PPP-projects in three different cities: Aalborg, Aarhus and Copenhagen.

France: more experimental character

In France PPPs have traditionally been used to support community services in road construction. Regarding urban freight transport, dialogue with private operators and joint public private initiatives have not been very substantial until the PDU (urban mobility and master plans) process was introduced in 1997. Most cities have only set up a forum for discussion with representatives from commerce and transport professionals. Some cities went further and have established specific experiments with both private and public funding.

Germany: most experienced in PPP in urban freight transport

First appearance of PPP in Germany was in the beginning of the 1990ies. One reason was that due to the German reunion high investments were needed to rebuild the infrastructure in Eastern Germany. A consideration of financing these infrastructure was to do it by Public Private Partnership. In the recent past PPP became more concrete due to the introduction of the heavy vehicles fee, to be introduced in Germany by August 2003. In urban goods transport various examples on PPP exists. In the 1990ies almost 100 cities set up city logistics co-operations. These city logistics co-operations followed the approach to cope with the different interests the different actors in urban goods delivery have and to come to a win-win situation for all actors involved. These city logistics co-operations have been mostly initiated by the chamber of commerce, transport operators and cities.

Greece: PPP are relatively new

The implementation of PPP in infrastructure projects in Greece is relatively new with the first efforts appearing in the 1990ies, during the implementation of the Community Support Frameworks. Partnerships between the Public and Private domains have been seen as an alternative way to privatisation where full privatisation was not acceptable. Like in many other countries, the involvement of private actors in the development of infrastructure projects was particularly welcome in the transportation domain, due to the significant capital investment required in such projects (PFI). There are mainly important infrastructure projects given where a PPP was launched, but there are no examples for taking PPP into account regarding urban freight transport.

Italy: PPP in urban freight transport are mainly realised in transshipment points

PPP in Italy, in the urban freight distribution sector, mainly represent a way for harmonising conflicting interests among different stakeholders and finding a solution (possibly a win-win solution) for implementing complex projects. The main field where some relevant PPPs does exist are the realisation of infrastructure and the management of specific logistic/transport services (e.g. transshipment centres).

Netherlands: PPP relating to urban distribution platforms

Public private partnerships have been introduced in urban freight distribution in the early nineties as a result of objections to regulatory measures taken by municipalities. Faced by the negative responses to these measures and the lack of interest in the problems other parties in the distribution process encounter, municipalities decided to ask the Chamber of Commerce, interest groups of shippers (EVO), of transports (TLN and KNV) to join in the planning processes in order to create support from the involved parties and the public.

In 1995, Platform Stedelijke Distributie (PSD, translated as Platform Urban

Distribution) was founded by the national government because of the following reasons:

- The failure of a significant part of national policies with focus on urban distribution
- The introduction of many municipal regulatory measures like delivery time windows and vehicle restrictions with limited access to cities.

Another important PPP-project in the field of urban freight transport that has been mentioned is the “Bevooradingsplan Binnenstad Utrecht”.

The most relevant type of PPP in urban distribution in the Netherlands are informal co-operations, but on municipal level a contractual PPP is a common phenomenon in the form of the declaration of intent. On a national level, contractual co-operation or joint ventures are not very common.

Spain: only experiences in financing of road projects

In general there are made no experiences with PPP in Spain with one exception: During the second half of the 90’s there was a resurgence in the financing of road projects in Spain through private finance. The First Phase of the National Motorway Programme, approved by the government in 1997, has been concluded with the award of the R-4 Madrid – Ocaña. Urban freight projects with support of PPP could not be found.

Switzerland: boom of PPP in city logistics in the 1990ties

In Switzerland PPP in passenger transport is more common than in freight transport for example in co-operative transport planning or agreements with private parties on the number of allowed car trips for a specific area. In the field of urban freight Switzerland saw a boom in informal public private partnerships as a consequence of the city logistics boom in the 90ties when several city logistics and urban freight research projects were launched within the DIANE 6 and the COST 321 programmes. With the decline of the city logistics boom the mentioned informal PPPs have mostly been abandoned too. Although the different actors know each other there is no institutionalised form of PPP anymore, e.g. on the basis of regular meetings.

United Kingdom: Freight Quality Partnerships

In the UK, like in most other countries, PPPs have been mainly “Private Finance Initiatives” which have been established to develop and manage infrastructure projects. There is no example given for using PPP operationally in the field of urban freight transport. But there are many examples given for an informal approach in solving problems regarding urban freight transport. It is in the area of a voluntary PPP the UK shows a lead. The concept of Freight Quality Partnerships was mooted by the Freight Transport Association (FTA) in 1997.

Australia: more a consultative approach but nowadays with efforts to a more formal approach

PPPs in Australia have mainly a consultative approach (informal PPP). The regulatory consultative process and the formal committee systems have a niche and useful role to strongly influence at least to give input into national debate and perhaps even the output of national policy formulation. There are existing examples in the area of urban freight transport. The first examples were for urban passenger services, for airport terminal and toll roads. The basic idea was to promote efficiency in the service delivered. Nowadays PPPs with focus on freight in general and urban freight especially get more attention. On November 2002 the national government released a transport concept paper called "AUSLINK" which does include policy initiatives with focus on urban, highway and intermodal freight issues. This possibly the first such strategic framework that is actively canvassing a formal role for PPPs in Australia.

### 9.3.3 Legal framework conditions

European background

As seen PPPs have become more important in the recent ten years. The question is: Are there given regulations or a general framework dealing with the problems and creation of PPP? Are there given unique patterns how to set up a PPP and help to find the right kind of co-operation?

On the European level no regulations do exist with direct regard to PPP. But there are existing regulations which indirectly influence the creation of a PPP. On the first the tendering regulations have to be named which are also affecting PPP. The EU has set up a very detailed procedure how to introduce the tender process for public calls. If public authorities want to involve private partners in projects and if these projects offer a financial profit, the authorities have to respect the official tendering procedures. It is not possible for them to give the project to someone private without creating a fair competition situation. Taking the example of the actually foreseen Danish-German bridge project "Fehmarnbelt" initiated by the German and Danish governments: This infrastructure project should be operated by a private investor. Before a private investor will receive the acceptance of bid a fair competition for all interested parties is prescribed. Otherwise the EU officials would intercede and require that the tendering process will start again newly. Therefore the private competitors which are interested in the participation in a PPP should take part in a tender procedure conforming with the EU regulations.

Furthermore there are regulations affecting the protection of the fair competition within the EU that have to be mentioned. A PPP can not be introduced if other competitors would be harmed and if in case of a PPP the private partner gets a too strong market position.

General situation in the countries:

No regulations with direct connection to PPP, but existing regulations indirectly influencing PPP

In the surveyed countries there are in general no legal frameworks given directly affecting PPP. Of course there are running discussions how to unify the procedure of creating a PPP but not in the area of urban freight transport. There are nearly no laws, regulations or guidelines existing how to manage and deal with PPP except in the case of Belgium where PPP explicitly is pre- and described in laws and regulations, in particular at the local level.

On national level there are of course existing regulations that indirectly affects the development of PPP like formal contracts, taxation laws, EU rules, constraints in economic supports (EU: the prohibition of unfair competition) and constraints concerning tender procedures.

Austria

The legal framework was probably one of the big critical factors that hold many concepts off realisation. As the legal conditions are rather complex, it is necessary that they are presented transparently and in a structured way. Points to consider in Austria: the formal contract, taxation law, EU – rules, constraints in economic support, constraints concerning tender procedures.

Belgium

Rules for PPP are explicitly described in Belgian laws and regulations, in particular at the local level. There are tools given helping to support the local authorities.

Denmark

There is no information available about the framework conditions for PPP in Denmark.

Germany

A legal framework was set for the private financing of public infrastructure (extension and new building of motorways, bridges, tunnels and specific routes). This legislation is mainly linked to the leverage of the heavy goods vehicles fee in August 2003.

For the support of co-operations there are no specific legislation or framework conditions in Germany.

Greece

At the moment there is no organised institutional/legal framework governing the creation of PPPs. Very detailed agreements are formulated on an ad hoc basis addressing all operational and legal aspects of each partnership. Each agreement, to be valid, is then voted as a law (ratified) by the Greek Parliament.

The formulation of the legal framework is currently in progress but there is

no information about the advancement stage of this effort.

Switzerland

Swiss politics in general is based on the idea of consensus which favours the establishment of informal PPPs. In fact it is common that a large number of stakeholders or associations representing them respectively are given the opportunity to express their opinion on the subject before a new law is established. The same goes partly for larger projects too. The idea of consulting stakeholders is based on the assumption that the actors concerned usually know the details of the subject best. Therefore the public should benefit from this source of knowledge. Additionally future opposition against a project or law respectively can be minimised by integrating all relevant actors right from the beginning.

Other countries

In most other countries a legal framework for PPP is not known. Often PPP is accounted more as an informal and consulting process in which the need for a legal framework is not affordable. But there has to be an acceptance for EU Member States to the EU legislation which also concerns the establishment of PPP-projects.

#### 9.4 Regarded case studies (project-level)

19 projects  
collected

19 projects from most of the participating countries have been collected. Table 1 gives an overview on all collected projects, the projects' phase, the type of PPP, the duration, the project initiator and the spatial orientation.

**Fehler! Verweisquelle konnte nicht gefunden werden.** gives a detailed and summarised description of all collected projects.

Focus on:

- contractual PPPs
- already operating
- most local

The following Table 12 gives an overview about the main characteristics of the collected PPP examples from different countries. As there can be seen most of the PPP projects regarding urban freight transport are already operating. Only the PPP within the project "Baustellenlogistik" in Berlin is stopped because the construction of the Potsdamer Platz is already finished.

Regarding the type of PPP the majority of the projects are on a contractual basis and are based on a closer co-operation. This reflects what is already said about contractual agreements in chapter 9.1.1.

Nearly all examples of PPP in context with urban freight transport are of a permanent duration and not only transitive. This shows that PPPs in urban

freight are based on a perennial operation and not only short-term projects and can therefore be seen as long-term investments.

The main focus of PPP in urban goods transport is on a local spatial extension which is reduced to the urban areas.

Main application  
areas of PPP

Concerning the contents of PPPs in urban freight transport nearly all researched projects are dealing with urban distribution and construction of logistics or distribution centres. Another approach can not be seen barely from the existing best practices. Other fields of application are licence solution like the example from Copenhagen (Denmark) has shown or the actually initiated congestion charge London (UK).

Best practices

For showing the experiences made in the surveyed countries selected best practices in each countries have been chosen. Ideally they should show how a PPP in urban freight does function and about that they should give some background information why this example does function very well and what have been or are the main difficulties within this named project.

The following figures give a short impression about the kind of PPP taken into account and about the main characteristics they have. Figure 123 gives an overview what type of PPP in the regarded case-studies is predominant whereas Figure 124 shows in which project phase the given examples are.

For the Australian example “Barnes Road Bridge Project” no further information about the type, project phase, duration and the project initiator is available.



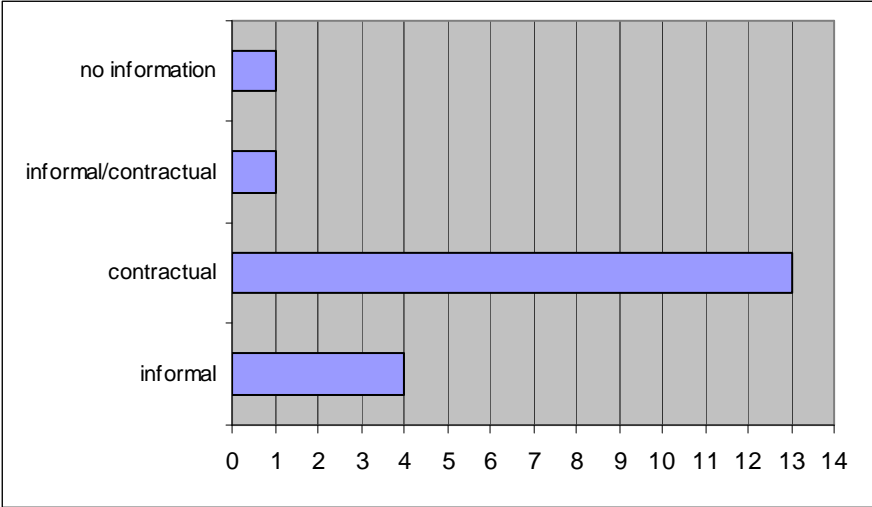


Figure 123: Type of PPP

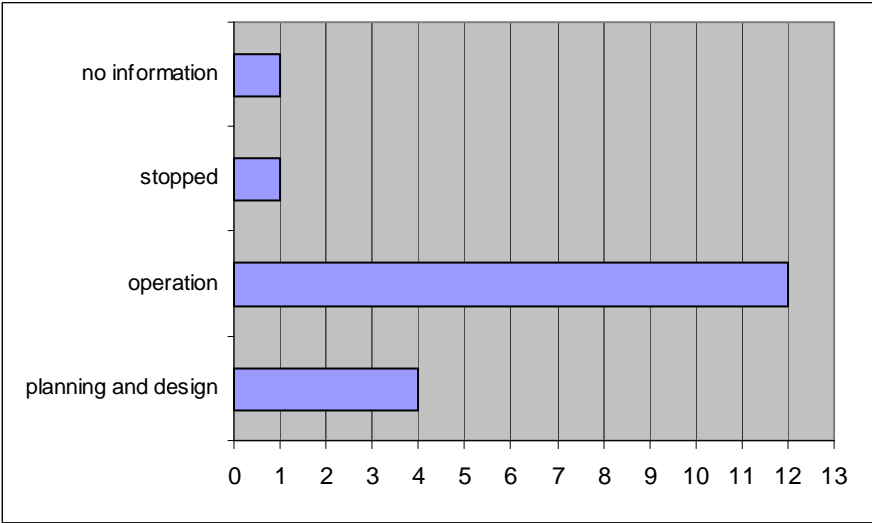


Figure 124: Project Phase of PPP

**Table 12: Overview on collected PPP projects (marked projects are presented in detail)**

Country	City/Region	Name of concept	Project Phase	Type	Duration	Spatial extension
AT – 01	Graz	Cargo Center Graz	realisation	contractual	transitive	regional
AUS – 01	Whole Australia	National Road Transport Commission 's Industry Advisory Group (IAG)	operation	informal	permanent	national
AUS – 02	State of Victoria	Barnes Road Bridge Project	not available	not available	not available	regional
AUS – 03	State of Victoria	Victorian - Road / Sea / Rail - Freight Advisory Council	operation	informal	permanent	regional
BE – 01	Brussels	MABRU – Marché matinal - Vroegmarkt	operation	contractual	permanent	regional
CH – 01	Basel	Basel City Logistics	operation	informal	permanent	local / regional
CH – 02	Thun	SpediThun	operation	contractual	permanent	local
DK – 01	Aarhus	Environmental zone scheme	operation	contractual	permanent	local
DK – 01	Aalborg	Transport co-ordination	operation	contractual	permanent	local
DK – 01	Copenhagen	Certification scheme	operation	contractual	permanent	local
DE - 01	Berlin	Baustellenlogistik Berlin	stopped	contractual	transitive	local
ES – 01	Malaga	Calle Camas	planning and design	contractual	?	local
FR – 01	Bordeaux	ELP (Espaces de livraison de proximité)	operation	informal/ contractual	transitive	local
IT – 01	Rome	Rome	planning and design	contractual	permanent	local
IT – 02	Siena / Terni	Urban goods distribution / Logistics platform	operation	contractual	permanent	local
IT – 03	Parma	Parma transit point	planning and design	contractual	permanent	local
NL – 01	Utrecht	Bevooradingsplan Binnenstad Utrecht	planning and design	contractual	permanent	local
NL – 02	Groningen	City Centre Distribution Groningen	operation	contractual	permanent	local
UK – 01	Whole UK	Freight Quality Partnerships	operational	informal	transitive	national

Assessment of the  
projects

The following project descriptions show examples of planned or implemented PPP-projects and assess the experiences made. As many innovative projects are planned or set-up a selection had to be made.

Thereby, the following aspects were considered:

- Relevance for BESTUFS, innovative character and contribution to solve problems
- Success / failure analysis and real world experiences
- Balance among countries and approaches
- Availability of existing and further information.

Example 9.4.2:  
Cargo Center Graz,  
CCG

### **Example 9.4.1: Cargo Center Graz (Austria)**

[CCG 2003; Erlach 2002]

#### **Key words**

**City and regional logistics, urban distribution, transshipment center, contractual PPP, cost sharing**

#### **Background**

The coming enlargement of the EU to the East and to the South-East means for Styria a chance and a challenge at the same time. Not only Styria leaves its position on the periphery in respect of geopolitics and economic policy, but also a new, growth-oriented market with about ten millions of people opens up at the same time. Already today the economic development of Styria is exemplary throughout Europe (an EU study proves it - together with Ireland and the Balearic Islands - to be a region with the most successful growth), but especially in the area of transport infrastructure, an area that will be of decisive importance for the future, the Federal Government of Austria and the Styrian Provincial Government put considerable efforts into making up for the failures of the past decades. Because of these reasons the Styria government looked for a solution for using efficient logistics capacities.

#### **Objectives**

It was aimed from the beginning on to establish a new (very first in Austria) freight village.

The Cargo Center Graz operates at one of the most important transport- and logistic junctions of Middle Europe - where the network of the European economic areas meets the requirements of the strongly expansionary economic region of Styria. The freight village located near Graz, which is the capital of the Styria province within Austria, has got a surface of 50 ha and is equipped with warehouses and transshipment facilities. The total investment was 130 m EUR.

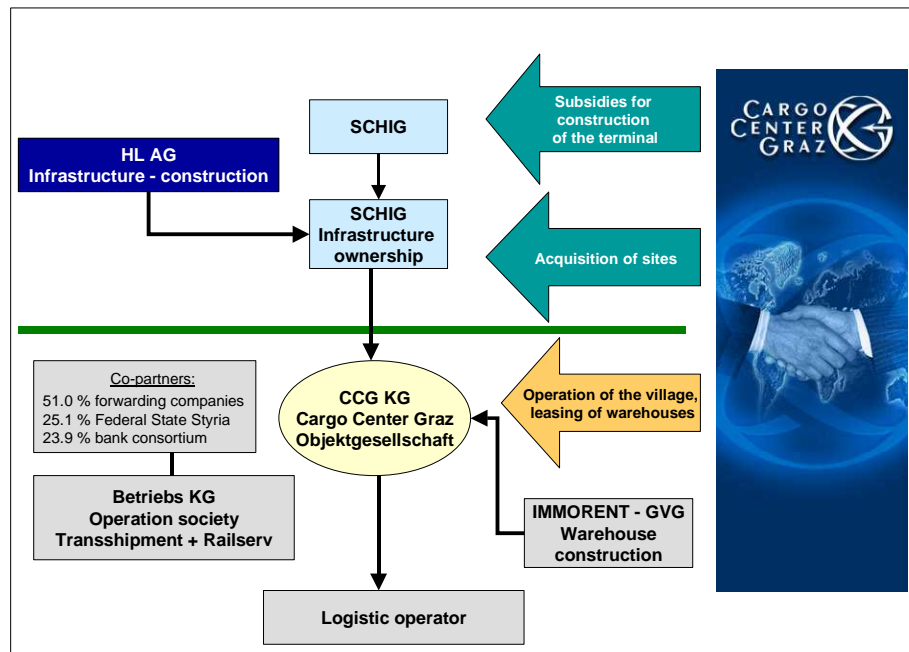


Figure 125: Cargo Center Graz – functional diagram [Erlach 2002]

Basic approach

After a long period of discussions and negotiations with the public federal railway without results an alternative concept was developed by the public authorities of the province of Styria and private partners. Private transport companies and forwarding agencies as well as the three largest Styrian banks form together with the Styrian Provincial Government and the Federal Government of Austria a Public Private Partnership-Model (PPP), which is new for the Austrian freight transport economy. Because of the dimensions of the project many important partners get involved – transport and logistic operators as customers/users of the facilities as well as the Railcargo Austria (Federal Railway), the Steiermärkische Landesbahnen (regional rail operator). The heterogeneous structure of the company meets traffic related public guidelines and provides the CCG with large-scale possibilities of proximity to the customer, market information and economic efficiency. Moreover, due to the planned close cooperation with the Steiermärkische Landesbahnen (STLB - the Styrian Railways Company) the CCG can act on the market like a railway company itself.

Parallel a city and country logistic initiative the so called “Styrialog” has been founded (another private company, supported by the Styrian government). This platform shall use the facilities of the Cargo Center Graz for distribution as a city terminal. The selection of the partners was a result of discussions and bargaining within the political administrative sector and regional lobbies, representatives of chamber of commerce, private transport operators and others.

The PPP is organised as a project which is supported by the public sector by

financing and construction of the infrastructure. As a owner of the area and the facilities the public sector is leasing it to a private limited company operated by

- Transport service providers
- Banks
- Energy supplier

In this private operating unit the public sector is not participating directly (just via a majority ownership of the energy supplying company).

The dialogue between the two parties is going on permanently on a very informal basis and between different partners but mainly between the managing director of the PLC and the political representative of the Styrian Government (responsible for economy).

The performance of the PPP will be monitored by the Styrian government but also by the federal government. But there are no specific procedures or evaluators known yet.

Financial solution

The whole infrastructure is financed by the public sector. The partners of the CCG have a limited risk in case of getting into economic troubles.

Future plans development

For the future an expansion and establishing in the network of freight villages is foreseen.

Results and experiences

It is too early to evaluate the results of the project. As far as the political and technical procedures are done the PPP works pretty well in a sense of implementation of the targets aimed at. The beginning of the operation of the freight village and its services (including urban freight deliveries) has been in June 2003. A critical aspect is the integration of the Rail cargo Austria and some other important partners, which is not fulfilled completely at the moment.

More information

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Example 9.4.3:  
Espaces de  
livraison de  
proximité (ELP)

### Example 9.4.2: Espaces de livraison de proximité (ELP) Bordeaux (France)

[Dablanc 2002]

#### Key words

**Unloading zones, urban distribution, distribution concept, informal/contractual PPP**

#### Background

There has been strong need for co-operation between freight operators and local authorities during the tramway lines in the inner city area have been under construction. So deliveries have been nearly impossible because of major ongoing public works in the city centre.

Regarding this a PPP was started as a general collaboration between freight organisations, the Chamber of Commerce (CCI) of Bordeaux and the Bordeaux metropolitan authority to design solutions for delivering the goods during the building of the new tramway lines (involving major public works in the city centre). It ended up with a specific project (ELP) with contractual commitments between parties involved to set up and co-finance specific delivery areas.



**Figure 126: Espaces de livraison de proximité (ELP) Bordeaux**

#### Objectives

The aim of this PPP was to find an acceptable solution for deliveries in the city center of Bordeaux. The aimed solution should solve the problems of traffic congestion and negative impacts.

#### Basic approach

At the start of this PPP a broad round table was established with the objective to bring as many partners as possible together and to discuss the

ongoing problems and possible solutions. All freight organisations have agreed to discuss possible solutions. The first main achievement of the PPP process set up by the CCI was to involve the three main truck organisations. For one year one meeting every three months with a private consultant was held who was hired to organise and manage the meetings and set up the ELP experiment project itself. Employing a private consultant was one of the success factors because he could manage and take care for the PPP more neutral compared with the situation a city official would manage the group. About that a consultant could act and manage this project more efficient. He was good in overcoming disagreements and initial opposition among truck companies' representatives.

Financial solution

Now the contractual PPP is between the CCI, the City of Bordeaux, the Metropolitan authority of Bordeaux and the national government. All these partners provide subsidies. However, neither local retailers nor the freight organisations have accepted to provide subsidies. Their participation is "intellectual" and above all they commit themselves in communicating on the project to their members so that the use of these specific areas will be facilitated among potential users (truck drivers).

Future plans development

Only one "ELP" will be implemented at the beginning for a three month period. If it is successful two more would be implemented. If the whole test is successful, these new unloading areas could become permanent. Therefore it is a step by step and careful approach.

Results and experiences

So far, the informal part of the PPP has been very well perceived by transport organisations. On the public side, the local officials were rather disappointed in realising that there was no financial commitment from the truck companies. This is why they chose a step by step and limited approach for further developments.

Truck organisations have committed themselves to be involved into dialogue and strategic thinking, but they have not accepted to finance the project.

A financial co-operation of the private sector and the local authorities for such experiments may take longer than just agreeing to discuss with public officials. Their understanding is that the public space is free and should remain as such.

More information

Direction of Studies of the Chamber of Commerce of Bordeaux or by GART

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Example 6.4.4:  
Marché matinal –  
Vroegmarkt  
(MABRU)

### Example 6.4.3: Morning market MABRU in Brussels (Belgium)

[Henry 2002]

#### Key words

**Urban distribution, contractual PPP, consolidation of products**

#### Background

In Brussels fresh products operations between wholesalers and retailers were spread in various places in the historical city centre. This led to congestion and to difficulties for both retailers and wholesalers. It was for example difficult for one retailer to go from one wholesaler to another. It also led to congestion and there were only a few possibilities of extension (thus the spread in different places). But fortunately the city had a plot of land available (an old gas factory owned by the city).



**Figure 127: The morning market MABRU in Brussels**

[http://www.mabru.be/nl/info\\_mab.htm](http://www.mabru.be/nl/info_mab.htm)

#### Objectives

The city thus decided to regroup all fresh product activities on this plot. There is still some scope for extension on the place. The Morning Market for fresh products MABRU was launched by the city of Brussels in the seventies. Some warehouses were available, and new ones were built on the ground formerly used by a town gas factory. MABRU provides an infrastructure used by wholesalers and retailers of fresh products (fruits and vegetables, flowers, etc.) for a rent.

#### Basic approach

In 1992, the city decided to have the market run by a non-profit organisation. Land and buildings were given to the organisation which is now managed by representatives of the city and of users. The management board of MABRU is composed of representatives named by the City Council (they have a majority of the votes and are either city councillors or users) and representatives of the users. Gromagro was the organisation representative

of users which were selecting the members of the board representing the users. However, the organisation has now disappeared to be replaced by another one called UMB. At this moment, they are quite disorganised and have problems appointing their representatives.

This illustrates the difficulty of organising a group including both large wholesalers and small retailers. The first ones because of their size tend to keep the power to themselves. One of the roles of the city representatives is to ensure that the interests of the small retailers are taken into account.

There are regular meetings of the managing board (monthly) and board of directors (once every 2 months). A general assembly is called upon twice per year. It has de facto a minor role being composed of the same bodies (only with more representatives) than the board of directors.

The management of MABRU is the responsibility of the managing director, under the supervision of the management board and the board of directors. The managing director, responsible for the management of MABRU was appointed by the board of directors and has a long-term contract.

Except the regular meetings of both boards and of the general assembly there are no specific measures to monitor the performance of MABRU. Annual reports are presented to the General assembly (and thus indirectly to the city council).

Financial solution

The investment was borne by the City of Brussels. The operations are financed by the rent paid by the users. This rent is a function in dependence on the space used by operations and the type of equipment used at that market space (e.g. an empty lot is worth less than a refrigerated one). Each user also pays for its electricity and water usage.

The organisation is self-supporting (there is no subsidy) as far as operation and maintenance are concerned.

Future plans  
development

A relocation of the market is under discussion (this is a very remote plan). It might be necessary to rebuild the warehouses to comply with new EU regulations on traceability and health. In this case the market is still in Brussels but a location further out is considered. There is scope for a limited extension on-site.

Results and  
experiences

The benefits for the users are the rationalisation of all the dealing between wholesalers and retailers in a single, well accessible place. Retailers do not have to face city centre congestion and to drive between several places. Comparison between products is easier. Wholesalers have an easier access to a large number of potential clients. A centralised market is also more attractive for more remote clients, and thus has larger potential catchment

area.

For the public authorities the benefits are in terms of less congestion in the city centre and to make sure that small retailers, useful for the life of the city centre, have a voice in the management of the sector.

The fact that it is self-financing (in terms of operation) is certainly one of the major reasons of the success of MABRU. The provision of building facilities by the city is of course another reason.

The scale of MABRU (it first serves the region of Brussels - one million inhabitants – but clients are coming from all over Belgium – 10 million inhabitants) is correct, but the market is only supported by the city of Brussels (the centre of the region, with only 130.000 inhabitants). This kind of initiative should be at the regional level.

This kind of public organisation of markets is in the interest of the collectivity, allowing the market not to be dominated by a limited numbers of large, oligopolistic actors (one of the large traders was paying a rent much lower than its competitors for example).

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Example 9.4.5: Stadtmobilität Thun ("city mobility Thun") – SpediThun	<b>Example 9.4.4: SpediThun (Switzerland)</b>  [Egger 2002]
<b>Key words</b>	<b>City logistics, urban distribution centre, distribution concept, informal PPP</b>
Background	<p>The association „Stadtmobilität Thun“ was initiated in 1997 by VCS, an association for transport and environment and the „IG Velo“, a cyclist lobby organisation. The main idea was to act instead of to react. The “Stadtmobilität Thun” association deals with any question or problem in relation to urban mobility in the city of Thun including urban freight (SpediThun). Its members are:</p> <ul style="list-style-type: none"><li>▪ VCS, an association supporting environmental transport like bike and rail</li><li>▪ IG Velo, a cyclist lobby organisation</li><li>▪ TCS, a lobby organisation for individual car usage</li><li>▪ STI, the public transport operator in the city of Thun</li><li>▪ the Swiss post</li><li>▪ a private local freight transport operator (one!)</li><li>▪ the municipality</li><li>▪ a bike courier</li><li>▪ the main operator of the municipal parking blocks</li></ul> <p>The association of inner city trade and retailers is currently being integrated.</p> <p>The association meets on a regular basis 3 to 4 times per year in a kind of “open general meeting”. In the 5 years since its foundation several innovative mobility projects have emerged from the association acting as an initiating platform or a facilitator. Projects initiated by the platform include a bike delivery system, an mobility information brochure for new residents or the project SpediThun.</p>
Objectives	SpediThun was started in summer 2000 under the motto “delivering together”. It emerged from the project “urban mobility” that was launched in 1997 by the municipality of Thun (40'000 inhabitants) and various transport associations. It was aimed to enhance heavy vehicle transport to carry out deliveries in the historical center of Thun.

SpediThun is a city logistics scheme operating an urban distribution centre. The project that emerged from the public private partnership “Stadtmobilität Thun” is also organised in a public private partnership itself.

Basic approach

The informal PPP is composed of five essential partners which are building a sort of steering committee for this launched project:

- the municipality as political partner and donor (project leader)
- Büro Rundum)obil, a private mobility consulting company that elaborated the scheme
- the association “Stadtmobilität Thun” as representative of various mobility organisations and mobility supplier (see above)
- the association of inner city trade and retail companies
- the Swiss post as an important representative of the local transport business
- an innovative transport operator who runs the platform

In collaboration with two local transport operators a terminal was realised in the outskirts of Thun. At the terminal the goods are reconsolidated and then delivered twice a day to the retailers in the inner city using appropriate vehicles adapted to the network of narrow streets downtown. The project aims at delivering at least 200 consignments per week, reducing the number of trucks with trailer downtown to zero and reducing the number of trucks downtown up to 20%. The project was started with an intensive marketing campaign including over 300 transport operators as well as local businesses. The SpediThun vans deliver mostly shops for household articles, entertainment electronics, sports articles, toys, books and newspapers. It is not suitable for textiles, fresh produce, watches and jewellery. In average, around 50 tons are delivered into the city per month (2001).

A part from the location of the terminal its opening hours are estimated to be crucial for the success of the project. Another key factors is seen to be the fact that the whole project is embedded in the framework project “urban mobility” which takes a governing and co-ordinating part bringing together the various actors and their differing demands and supplies while knowing about the specific details and complexity of the transport business. Furthermore the involved transport operators are known to be highly innovative, have good local contacts and have a close relation to the project (it's “theirs”). Another point is probably the less fierce competition in the local market, as the two participating companies are the major local market players. Like this they can take full advantage of their know-how of the local framework conditions.

Financial solution	<p>The projects did not receive any subsidies apart from a kick-off credit. Today it is economically independent and apparently attractive for the two transport operators involved (at least when taking into account the image gains and PR-effects). The transport operator covered their entire costs due to terminal investments etc. The municipality covered the cost for public relations and marketing. All other members of the working group covered their own expenses.</p>
Results and experiences	<p>At the beginning personal contacts were crucial but finally the partnership worked out well. Nevertheless the steering group broke up after the launch of the project and a first evaluation meeting.</p> <p>A success factor for the partnership and the project respectively was the broad composition of the steering group. An innovative actor is needed for initiating the project, but broad partnership is necessary in order to reduce the implementation risk.</p> <p>Although the partnership was attached to a project, thus temporary, it was broken up too quickly. The partnership should have continued in order to elaborate further measures supportive to the project.</p>
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Example 9.4.6:  
City Centre  
Distribution

### **Example 9.4.5: City Centre Distribution Groningen (Netherlands)**

[Broersma/Kramer 2002]

#### **Key words**

**City distribution, time-windows, timely access regulation**

#### **Background**

Being the largest city in the north of the Netherlands Groningen is a regional economic centre with 175'000 inhabitants. It is connected to the rest of the country by road, rail and inland shipping and has a connection to the seaport Eemshaven. Groningen has a strong regional function for more than half a million people.

About that Groningen can be characterised as a town with an old historical centre which is more than thousand years old with shopping function and a high level of entertainment and cultural possibilities. This leads to a very high degree of quality of live.

But there have been existing a lot of inner-city problems that reduces this nice and convenient atmosphere. Especially traffic problems and connected with this environmental problems and the decrease of quality of life occurred by road traffic. One reason is the commuting situation in the greater area of Groningen. Half of the people who work in Groningen live in the outskirts of Groningen or in the regional area. About that deliveries into the city centre have caused an additionally traffic volume with the consequence of a high noise level and air pollution.

In 1977 the introduction of a Traffic Circulation Plan was introduced and has been in the result not very satisfactorily. In this concept the relevant economic key-players were not involved and therefor especially shop owners in the centre were very unsatisfied with this new policy that aimed to reduce traffic in the inner-urban area. About that the plan was introduced in three weeks which lead to the assumption that problems are foreseeable.

In the beginning of the 1990 a reestablishment of conversation between the official authorities and transport companies was done.

#### **Objectives**

As consequence of this politics in 1994 a new approach was tried: the "City Centre Better". In this project all the main players have been involved from the beginning on, so that the project process could be influenced by as many parties as possible who are involved in this problem. It was aimed to a consensual solution which is acceptable for all parties and is passable for them. It should guarantee an efficient and economical solution especially for the transport companies and an satisfactorily answer regarding the environmental problems and the quality of life from the view of the cities'

authorities.

The result of this contractual PPP have been the following measures:

- The enlargement of the pedestrian area
- Time-windows for distribution in the car-free areas between 5 and 11 a.m. and 6 and 8 p.m.

Basic approach

The Municipality of Groningen, more precisely spoken the city council initiated the project in close co-operation with representatives of the local business and several market parties:

- Groninger City Club (lobby group of local entrepreneurs)
- Chamber of Commerce
- EVO (lobby group of shippers, receivers and transporters, in this case one-man transport companies)
- TLN (Transport en Logistiek Nederland: lobby group of professional road transport)
- KNV (employers' organisation of professional passenger- and goods transport)
- Department of Public Works Noord-Holland
- Traffic police

For the improvement of the accessibility of the city centre for transport services an experiment was introduced. For two distribution companies delivering goods from the outskirts of Groningen into the city centre it was allowed to make their deliveries outside the time windows all the day. Both parties benefit from this experiment. The distribution companies gained a better efficiency and the local authorities a better living and environmental situation.

In consequence of this experiment an "Advisory Commission for distribution issues" has been set up by the City Council to supervise the test. This was the basis for a successful PPP. The PPP has an informal approach but on a contractual basis.

In 1998 in accordance with the advice of the Advisory Commission the project became a new direction towards more structural policy. The new additionally measurements have been the permission for 3.5 tonnes trucks to use bus lanes and cross sections during the defined time windows. From official site new research inputs have been delivered.

Nowadays the foreseen transport companies for the delivery of the city centre rises up to three distributors. Three fresh goods distributors and even three more are under discussion. The conditions for the delivery of the city centre are a minimum of 100 deliveries per day at 20 addresses, the usage



of environmental vehicles (EURO-2; at the time point of introduction), the signalisation of vehicles with a city distribution logo, speed limits etc. Following concessions have been made from official site: the usage of bus lanes and the crossing of sections boundaries outside the time-windows.

**Financial solution** The partners committed themselves to bring input and way of solution into the pilot project. But there is no financial commitment between the involved partners. The philosophy has been that both partners benefit from this partnership.

**Future plans development** In the future a further improvement of the policy of co-operation will be continued. It should be aimed to support this policy and project by additionally technical applications like the usage of more environmental vehicles (electric vehicles) or maybe a concept of underground logistics.

**Results and experiences** The research activity in Groningen has shown the positive reaction from all parties and positive results (i.e. no problems with flow public transport, less transport time in the inner city area.

The deliveries became more efficient and more economical for the transport operators. On the other hand the environmental situation and the quality of life has become better.

In 1999 Groningen has won the first price of a city distribution contest, offered by the National Platform City Distribution.

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Example 9.4.1:  
Bevoorradsingsplan  
Binnenstad Utrecht

### Example 9.4.6: Bevoorradsingsplan Binnenstad Utrecht (Netherlands)

[Schoemaker 2003]

#### Key words

**Urban distribution, distribution concept, contractual PPP, cost sharing,**

#### Background

The current main program is the “Bevoorradsingsplan Binnenstad Utrecht” (distribution plan for city centre of Utrecht). In addition several smaller programs are active, such as the exemption regulation for vehicles from commercial urban distribution centres, the “Bierboot” (ship used for the beer supply to bars and restaurants in the city centre).

The city centre of Utrecht has some peculiarities that ask for careful consideration of the measures to be taken. Utrecht has a historic city and an adjacent large shopping mall like centre, which when it was built was the largest of its kind in Europe. The historic centre has several sensitive features: it has some large old canals and bridges. The quays are used for traffic and parking and in the inside of the quays are cellars which are now frequently used as bars and restaurants. Because of these delicate structures, large heavy vehicles are banned from these parts of the city centre. The combination of these factors significantly effects the efficiency of the distribution.



### Figure 128: City of Utrecht

Objectives	<p>The main purposes of the PPP-project are to:</p> <ol style="list-style-type: none"><li>1. analyse the current practise and the type and size of problems in urban distribution in Utrecht.</li><li>2. development of an urban distribution plan as a short term solution for the supply of the city centre of Utrecht (only considering road traffic).</li></ol>
Basic approach	<p>The “COMMISSIE van ADVIES inzake BEVOORRADINGSAANGELEGENHEDEN in UTRECHT (CABU)” initiated the project by advising the city council to develop a distribution plan. The city council adopted this advise, but under the condition that private parties within the CABU would contribute to the development of the plan, either financially or by human effort. The private parties that are now co-producing the plan selected themselves by applying to this demand. The collaboration is officially signed by all parties in a declaration of intent in which the responsibilities, legal context and basic conditions are laid down.</p> <p>The solutions considered in this project are:</p> <ol style="list-style-type: none"><li>1. routing of distribution traffic to, from and inside the city centre.</li><li>2. loading and unloading locations.</li><li>3. delivery time windows.</li><li>4. the role of urban distribution centres.</li></ol> <p>The main responsibility lies with the municipality (project leader). The other parties have the role of a project member. The group meets once every three or four weeks, but the individual members have regular e-mail contact. The work is divided based on the specific knowledge of each member. The members are:</p> <ul style="list-style-type: none"><li>▪ Chamber of Commerce:</li><li>▪ Interest group of shippers (EVO)</li><li>▪ Interest group of transporters (TLN)</li><li>▪ Interest group of entrepreneurs in the city centre (Platform Binnenstad Utrecht)</li></ul> <p>The reason for inviting the involved parties to the planning process is that the city councillor wished to involve these parties. This would provide input of ideas, streamlining of the process, partial financing (indirect, by providing human effort), and information about the way the distribution is organised from the point of view of the delivering and receiving parties. During the process, the local police will be consulted on the feasibility of enforcement of the regulations. The residents have already been consulted through an</p>

enquiry, but will have the opportunity to comment again through the neighbourhood council.

Financial solution

The costs are shared between the partners: the municipality delivers 80% of the project maximum of 500 hours, the other parties together deliver 20%. All other costs are paid by the municipality.

Future plans /  
Development

There are plans to perform a zero state measurement and an after-implementation measurement. No decision has been made, though.

A more comprehensive strategy can only be developed after the analysis made in this project.

Results and  
experiences

As the project is still in the planning phase no definitive conclusions can be drawn. Up till now the experiences have been positive: there is relevant input from all parties, there is a true collaboration and no conflicts avoided have been encountered.

The main benefits for the private partners are to be directly involved in the planning process. For the public partner the benefits lay in the constructive input from interest groups, a more streamlined process and some financial benefits.

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## 9.5 Synthesis from the case studies

Reasons for the need of PPPs in urban freight transport

As seen in most examples PPP-projects are concentrating on urban distribution and city logistics. The background for these partnerships is based on essential problems in urban areas like:

- traffic congestion
- environmental impacts (noise and air pollution)
- damages on the historical structure and buildings
- the missing of loading and unloading zones
- time losses in delivery
- lack of space

However the reviewed examples show that the main reason for building a PPP in urban freight transport is the balance between economical best solutions and reducing impacts on environment.

Most environmentally impact can be seen in traffic congestion in inner-city areas. Above all the comprehensive problem situation and the various elements influencing traffic congestion make clear that a need of comprehensive solutions is necessary for acting against this. Therefore different stakeholders are involved finding an appropriate solution. But that has to be mentioned not without managing an appropriate economic basis for all stakeholders and participants.

The influence of public bodies in freight issues is limited compared with those in public transport, because most of the freight activities are carried out by private enterprises. Therefore it is more than necessary to involve the private parties for finding a balanced answer to the existing problems.

Different stakeholders are involved in PPPs

Taking into account the above named reasons PPP-solutions in urban freight are necessary. Because of the interests of many different stakeholders in urban freight transport and the co-ordination of the inner-city goods flows partnerships has been taken as basic approach to solve the problems.

To represent the different interests private parties and administration bodies worked together in those projects. The main actors in PPPs in urban freight transport are:

- the municipality and local administration bodies
- shippers
- logistic services

- road hauliers and
- terminal operators
- consultants

In case of the project SpediThun which has created a platform for deliveries into the inner-city, different stakeholders have created this PPP: the municipality as project leader, a private consulting company for advisory in questions of mobility, associations to ensure the interests of their members, the Swiss post and an innovative transport operator who acts as operator and conducts the delivery system.

Objectives and tasks

The different participation in those PPPs varies in dependence on participants' expertise and know-how, their importance for this project, their financial part of investment etc. The reviewed examples show that there are existing a lot of different objectives and tasks within a PPP and participants meet various tasks. The main tasks are:

- to exchange knowledge
- to deliver input of ideas
- to increase efficiency in project management
- to aim a more practical point of view and
- to share investment costs
- to create a win-win-situation for all partners

Taking the mentioned examples into account many different tasks are the result of a PPP. In the Dutch project "Bevooradingsplan Binnenstad Utrecht" for example the tasks have been to share the specific knowledge of each member, to provide input of ideas and partial financing. In the case of the example from Bordeaux an objective was to discuss together the problems and to find together solutions.

Type of PPP: most are contractual co-operations

In part 9.1.1 of this handbook different kinds of PPP have been explained. There can be made a differentiation in dependence on the type of formalisation and involvement of private partners:

- informal co-operations
- contractual co-operation / agreements
- joint ventures

In the selected examples only the two categories informal or contractual co-operations are represented but mainly with a focus on contractual co-operation. It has to be mentioned that contractual PPPs shown in the

examples do of course include informal aspects. The involved partners take care to exchange information, to discuss possible solutions and to deliver ideas and input into the projects but more on a contractual basis. Often the contact between the private parties and the public site has foreseen the private operation of a project or concept like given in the Austrian example Cargo Center Graz or the Swiss example SpediThun.

There is no example for a joint venture given. Also the other examples not explained in detail in this chapter show no joint venture as co-operation form.

Financial solution:

The financial solutions depend on different factors:

- the complexity of the project
- the PPP-model: informal, operational
- the risks and opportunities
- the benefits for both partners (return on invest)
- the duration: permanent or transitive
- the responsibility of each partner

The given examples show different solutions for financing PPP-projects: In the case of the Cargo Center Graz for example the infrastructure investments are done by the public site and the investments for operation by private investors. Because of the complexity and the high investments of this project a share of costs and know-how seemed to be useful. Nevertheless for the involvement of private partners it is important that there will be a profit situation for the private investors. In the Swiss PPP-project SpediThun the two private transport operators ensure the investments for the operations whereas the municipality of Thun finances the marketing campaign and the public relation management.

Thematic fields of application in urban freight

Most of the PPP-projects in the area of urban freight transport shown in the examples are focussed on distribution issues. On the one hand the planning of optimised distribution centres is a key application area of PPP where often the infrastructure planning and financing is done by the public side and the operation of a centre is managed by private enterprises (see also the example Cargo Centre Graz), on the other hand good flow optimisation in inner-urban areas is a point for building a successfully PPP (see Bevoorradingplan Binnenstad Utrecht). In the second case the private side is mostly involved in a discussion process whilst the official side has the role to implement plans and activities (Bevoorradingplan Binnenstad Utrecht).

## 9.6 Conclusions and recommendations

### 9.6.1 Conclusions

Framework conditions of a PPP

There are several framework conditions that favour the building of a PPP:

- less public budgets
- public interest and acceptance among users
- complex projects
- lack of information
- problems in efficiency

Good experiences in PPP regarding urban freight transport

The analysis of best practices has shown that there are a lot of examples of PPP in transportation in general covering both passenger and goods transport. The focus of PPP has been or is on financing infrastructure by support of private investors.

But there are also good examples existing dealing directly with urban freight issues Like for example:

- MABRU Morning Market, Brussels (BE)
- SpediThun, Thun (CH)
- Basel City Logistics, Basel (CH)
- Construction Site Logistics, Berlin (DE)
- City gods, Copenhagen (DK)

The main field of PPP-establishments in urban goods transport can be identified in city logistics, road pricing and the development of urban distribution centres. But also in the field of:

- city access regulations
- transport co-ordination or
- waste management

Win-win-situation as condition for a successful PPP

Public projects and goods often require a macroeconomic efficient production.

The main aims of PPP in the field of transport for public authorities are:

- economical benefits,
- improvement of quality of life and environment



- the improvement in traffic security
- Know-how exchange

Private parties aim to realize:

- return of investments by economic benefits
- image and publicity (marketing aspect)

The main interest from private side is given if they can function as operator of a business model. Especially the operation of a distribution or logistic centre is of high interest for private stakeholders.

But public authorities are often rather interested in an informal exchange of knowledge or in creating ideas together. But nevertheless this can only run if for both parties a win-win-situation can be realised. There will be no acceptance from private enterprises if they do not profit from a built PPP. The profit can be a return of invest in form of money or image, but normally financial profits are crucial for them.

Exchange of information and knowledge is essential for project initiatives

The examples show that public authorities formulate their need for information and know-how with regard to the initiation and management of projects. Therefore they are looking for institutions, enterprises and consultants supporting them in projects by delivering input in form of ideas or project management.

Institutions like universities are often involved in projects because they can report about actually research experiences from similar projects. Consultants often advise the public bodies in financial and operational matters and enterprises like transport operators can bring practical experience into the project and can point out possible difficulties regarding to the project implementation.

Most projects have been implemented on a local level

Most of the regarded case studies have been implemented on a local level. But freight transport is often carried out on a broader spatial extension at least a regional level. However the involved partners have been mainly from the local area.

### 9.6.2 Recommendations

Broader spatial extension of projects

As seen the most projects are based on a local level and the partners are mainly coming from the local area. Nevertheless urban freight has regionally impacts which imply that focus should be seen on a broader spatial extension. If environmental problems or congestion are the reason to create a PPP to find an appropriate solution in urban freight transport partners from a broader spatial extension at least from a regional should be involved. Taken the deliveries in urban city centres as example a considerable number of deliveries are coming from regional distributors or vice versa deliveries from the inner urban area have their receivers outside the city. This implies that problems are based on a broader spatial extension and are not only problems of the city.

But it has to be mentioned that complexity of communication and management within the project will grow if more partners are involved. Therefore a PPP with few partners as possible but with carefully selected ones could be efficient and could be an approach to find a practicable solution.

Involvement of state-ministries and regional bodies

The best practices are exclusively dominated from local initiatives and represented by local authorities. In none of the case studies, except the project of the Cargo Centre Graz, any regional or state administrations have been involved. Problems in urban freight are a general problem that matters not only the local administration but also state and regional administrations. There are also no national research activities given in the field of PPP in urban freight transport. Taken this into account state-ministries should show more efforts to support initiatives. So they could for example initiate new pilot projects, co-finance projects or only be involved as moderator between the partners.

Only with focus on urban distribution and the construction of logistic center

PPP in urban freight is focused, as seen in the majority of projects, on the optimisation of urban distribution, road pricing or the construction of logistics and distribution centres. But there are existing more application areas for creating a PPP in urban freight transport:

- the usage of ITS in urban freight
- city access management
- the development of environmental-friendly vehicles for goods distribution (in this case the official authorities are asked to support the private industry)

- loading zone management etc.

As shown there are more possibilities given to think about new strategic partnerships.

Dialog with all  
transport operators  
not only with focus  
on freight transport  
operators

The most PPP in the field of urban goods transport only involve partners from the freight transport business. Because of the complexity to solve environmental problems or congestion in inner-urban areas it would be advantageous to integrate also other interest groups like public transport services. It should be aimed to find a comprehensive approach which affects all kind of transport and all modes. Single views on a problem often cause a one-way solution or in worse case shift the problem. Therefore an integrated approach could help to solve comprehensive problems. But in this case the complexity and communication can be more difficult because different stakeholders have different interests and objectives.

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## ABBREVIATIONS

EU	European Union
ELP	Espaces de livraison de proximité
FQP	Freight Quality Partnership
IAG	Industry Advisory Group
VCS	Verkehrsclub Schweiz
CABU	Commissie van Advies inzake Bevoorradingsaangelegenheden in Utrecht
EUR	Euro
STLB	Styria Railways Company
DSB	Danske Statsbanen
CCI	Chamber of Commerce
MABRU	Marché matinal Bruxelles
TCS	Touring Club Schweiz
NRTC	National Road Transport Commission
AUS	Australia
CH	Confoederatio Helvetica
IAG	Industry Advisory Group
UNIDO	United Nations Industrial Development Organisation)
IAEA	International Atomic Energy Agency
AT	Austria
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
BROT	Build-Rent-Operate-Transfer
CCG	Cargo Centre Graz
e.g.	Example given
EC	European Commission
<b>EVO</b>	
FTA	Freight Transport Association
ITS	Intelligent Transport System
JV	Joint Venture
KNV	Koninklijk Nederlands Vervoer
NL	The Netherlands
OECD	Organisation for Economic Co-operation and Development
<b>PDU</b>	
PFI	Public Finance Initiative
PPC	Public private comparator
PPP	Public Private Partnership
PR	Public Relation
PSD	Platform Stedelijke Distributie
R&D	Research and Development
SPV	Special purpose vehicle
TLN	Transport en Logistiek Nederland
TN	Thematic Network
UFS	Urban Freight Solutions
UK	United Kingdom
VMS	Variable Message Sign
GDP	Gross domestic product
SNCB	Société nationale des chemins de fer belge
SNCF	Société nationale des chemins de France
NGO	Non Government Organisation
GVZ	Güterverkehrszentrum
LTP	Local Transport Plan

DfT	Department for Transport
HBCC	Hobsons Bay City Council
VRFAC	Victorian Road Freight Advisory Council
VSFIC	Victorian Sea Freight Industry Advisory Council
VRFAC	Victorian Rail Freight Advisory Council
ADEME	Agency for Environment and Energy Savings