

SUGAR

Intermediate workshop - Good practice round table on leverages and experiments in city logistics in Europe

THE CITY FREIGHT DELIVERY PLAN IN BOLOGNA



COMUNE DI BOLOGNA

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03/05/11 - University Foundation, Brussels

BOLOGNA: GENERAL DATA



	N° Inhabitants	Area (Km ²)
Pedestrian Areas	~ 12,000	0.88
Limited Traffic Zone - L.T.Z.	~ 45,000	3.20
City Centre	~ 53,000	4.51
Municipality Area	~ 373,000	140.85
Overall demographic size	~ 650,000	

Daily movements ~ 2 Million	
internal	45%
exchange	28%
crossing	27%
Peak times ~ 200,000	

Modal split (internal movs)	
Cars (driver)	28%
Cars (passenger)	7%
Motorbikes	11%
Public Trasport	26%
Bicycle	7%
Pedestrian	21%

THE FREIGHT DISTRIBUTION PLANNING

Preliminary evaluation: freight operators in LTZ



- 67% of the trips with saturation < 25%
- only 12% of the trips with saturation > 50%
- own account operators (i.e. small operators) have a halve delivery rate than third party operators (i.e. large companies)
- own account operators don't have the economic power to invest in physical big structures (as large companies have) → “just in time” modality, no co-ordination and inefficiency

Preliminary evaluation: freight reserved parking slots as today



- slots often already taken by other vehicles (mainly other lorries)
- slots not present/too far



THE FREIGHT DISTRIBUTION PLANNING

Planning to regulate and improve freight distribution in Bologna:

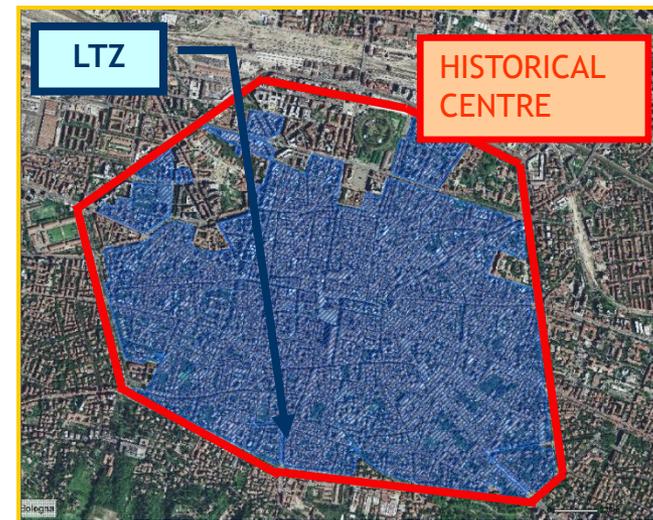
- 2005 - Air Quality Plan: introduction of Intelligent Transportation Systems ITS for automatic enforcement
- 2006 - City Freight Delivery Plan
- 2007 - Urban Traffic Plan
- 2008/2009 - “Van Sharing” Project and European Community financed project (Civitas Mimosa and Smartfreight)

The topic of freight distribution in the city has been approached using to advantage the synergy and integration between **Intelligent Transportation Systems** (for traffic monitoring and management) introduced by the Air Quality Plan and the **road pricing policy** introduced by the City Freight Delivery Plan

ITS IN BOLOGNA

SIRIO: Enforcement system for access in LTZ - Launched in Feb. 2005

- **LTZ Area:** 3.2 km² (around the 80% of the city centre)
- Restrictions from **7 AM to 8 PM**, no restrictions on Saturdays
- **LTZ Access control:** 10 gates monitored by cameras
- Number of **LTZ Access Authorisations:** around 60,000
- The system **automatically generates fines** for transgressors



ITS IN BOLOGNA

RITA: Enforcement system for access to bus lanes and “T” and “U” Areas

- Access control to the “T” Area (3 main central roads) : 3 gates
- Access control to bus lanes : 10 gates monitored by cameras
- Access control to the “U” Area (university zone) : 2 gates
- Control of cars and motorbikes
- Restrictions are effective 24 h a day
- The system automatically generates fines for transgressors



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Regione Emilia-Romagna

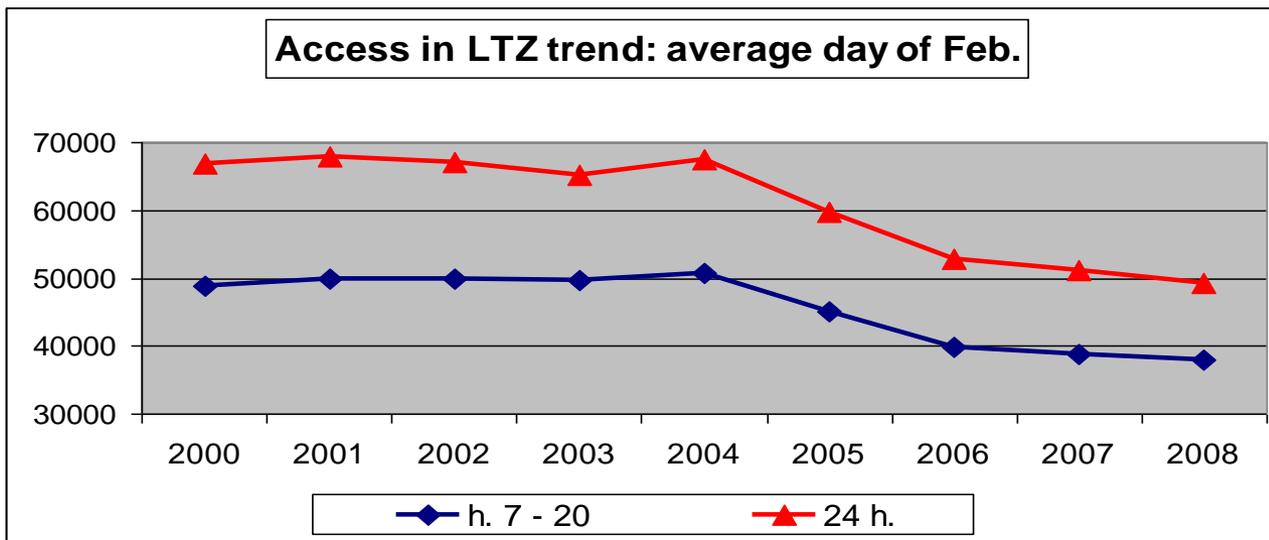


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ITS IN BOLOGNA

ITS results (since 2004)

- - **25%** of unauthorised cars in LTZ
- - **30%** in the 3 main roads in the centre
- - **70%** of unauthorised vehicles in “U” area
- - **70%** of unauthorised cars in PT dedicated lanes



THE CITY FREIGHT DELIVERY PLAN - launched on 2006

The City Freight Delivery Plan

Goals:

- Optimisation of access in LTZ and better organisation of the distribution processes
- Conversion toward less pollutant vehicles
- Promoting joining process between small operators and optimising load/upload process
- Optimising road and parking slot occupation

Actions for freight operators - 2 phases:

Phase 1



- 1a. Pricing policies implementation
- 1b. Access rules depending on pollution category

Implemented

Phase 2



- 2a. Access rules refinement
- 2b. Van Sharing Project

Implementation in progress

THE CITY FREIGHT DELIVERY PLAN - Actions implemented

Phase 1a. Pricing policies

1. Payment of yearly delivery permits to LTZ

The permits, which were previously released for free and with no time limit to all operators, have been issued under the payment of a yearly subscription, which varies in relation to the pollution category of the vehicle (i.e. Euro category), and with a validity of 2 years.

Prices: from 25 € to 300 € per year

2. LTZ “pay-to-access” ticket

Tickets have been introduced to allow people, not otherwise entitled, to occasionally access the LTZ area

Features:

- daily ticket (5 €)
- 4 day ticket. Valid for 4 consecutive days (12 €)

Limits: Each month, only 3 daily tickets (or just one 4-day ticket) can be used for the same vehicle.



THE CITY FREIGHT DELIVERY PLAN - Actions implemented

Phase 1 - first results

- Reduction of LTZ access permits delivered:

BEFORE PRICING POLICIES:



AFTER PRICING POLICIES:



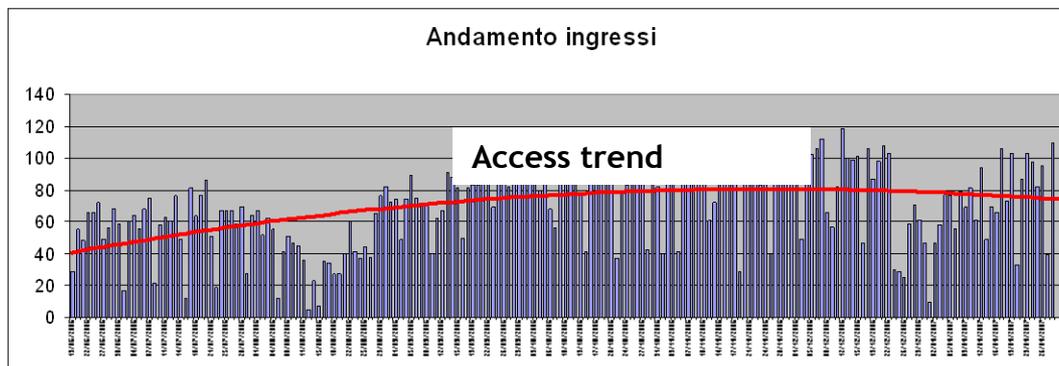
- CNG/LPG/Electric lorries, before almost non existent, raised considerably (today about 5%) and good results also for conversion toward Euro vehicles

THE CITY FREIGHT DELIVERY PLAN - Actions implemented

Phase 1a. Pricing policies

“PAY-TO-ACCESS” TICKET

- 1 - Validation of the ticket
- 2 - Sending secret code and car plate number, via SMS, WEB, CALL CENTER
- 3 - If ok, SIRIO authorisation released

- Tickets used to enter the LTZ: about 125 per day; the system assures flexibility without increase too much the accesses in the LTZ

THE CITY FREIGHT DELIVERY PLAN - Actions implemented

Phase 1b. Access rules depending on pollution category

The access to the inner city (“T” area), controlled by enforcing cameras, has been modulated on temporal windows depending on the pollution category of the vehicles:

- 3,5 hours/day for non-Euro vehicles
- 7,5 hours/day for Euro vehicles
- 9,5 hours/day for CNG*/LPG*/Electric vehicles

*Compressed Natural Gas

* Liquefied Petroleum Gas

On 2008 the same rules have been introduced to regulate access to the University “U” Area as well



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European Union
European Regional Development Fund



Regione Emilia-Romagna



Made possible by the INTERREG IVC programme

THE CITY FREIGHT DELIVERY PLAN - Actions in progress

Phase 2a. Access rules refinement

Improvement of the access rules in the “T” and “U” area and extension of the same policy to the entire Limited Traffic Zone, taking into account the pollution level of the freight vehicles

AREA “T” e AREA “U”

As today

AREA “T” e AREA “U”	20.00 - 6.00	6.00 - 6.30	6.30 - 7.00	7.00 - 7.30	7.30 - 8.00	8.00 - 8.30	8.30 - 9.00	9.00 - 9.30	9.30 - 10.00	10.00 - 10.30	10.30 - 11.00	11.00 - 11.30	11.30 - 12.00	12.00 - 12.30	12.30 - 13.00	13.00 - 13.30	13.30 - 14.00	14.00 - 14.30	14.30 - 15.00	15.00 - 15.30	15.30 - 16.00	16.00 - 16.30	16.30 - 17.00	17.00 - 17.30	17.30 - 18.00	18.00 - 18.30	18.30 - 19.00	19.00 - 19.30	19.30 - 20.00
Veicoli metano/GPL - contrassegni DSV, DSG, DSI, F																													
Veicoli ECO - contrassegni DSV, DSG, DSI, F																													
Veicoli NON ECO - DSV, DSG, DSI, F contrassegno A																													
ZEV																													

After next implementation

AREA “T” e AREA “U”	20.00 - 6.00	6.00 - 6.30	6.30 - 7.00	7.00 - 7.30	7.30 - 8.00	8.00 - 8.30	8.30 - 9.00	9.00 - 9.30	9.30 - 10.00	10.00 - 10.30	10.30 - 11.00	11.00 - 11.30	11.30 - 12.00	12.00 - 12.30	12.30 - 13.00	13.00 - 13.30	13.30 - 14.00	14.00 - 14.30	14.30 - 15.00	15.00 - 15.30	15.30 - 16.00	16.00 - 16.30	16.30 - 17.00	17.00 - 17.30	17.30 - 18.00	18.00 - 18.30	18.30 - 19.00	19.00 - 19.30	19.30 - 20.00
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Improvement of the access rules in the “T” and “U” area and extension of the same policy to the entire Limited Traffic Zone, taking into account the pollution level of the freight vehicles

ZTL																										
As today																										
Area ZTL	7.00 - 7.30	7.30 - 8.00	8.00 - 8.30	8.30 - 9.00	9.00 - 9.30	9.30 - 10.00	10.00 - 10.30	10.30 - 11.00	11.00 - 11.30	11.30 - 12.00	12.00 - 12.30	12.30 - 13.00	13.00 - 13.30	13.30 - 14.00	14.00 - 14.30	14.30 - 15.00	15.00 - 15.30	15.30 - 16.00	16.00 - 16.30	16.30 - 17.00	17.00 - 17.30	17.30 - 18.00	18.00 - 18.30	18.30 - 19.00	19.00 - 19.30	19.30 - 20.00
Veicoli metano/GPL/ZEV - contrassegni A, DSV, DSG, DSI, F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Veicoli ECO - contrassegni A, DSV, DSG, DSI, F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Veicoli NON ECO - contrassegni A, DSV, DSG, DSI, F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
 accesso consentito eccetto periodi soggetti a provvedimenti anti-smog (da 10-2004 a 03-2005)																										
After next implementation																										
Area ZTL	7.00 - 7.30	7.30 - 8.00	8.00 - 8.30	8.30 - 9.00	9.00 - 9.30	9.30 - 10.00	10.00 - 10.30	10.30 - 11.00	11.00 - 11.30	11.30 - 12.00	12.00 - 12.30	12.30 - 13.00	13.00 - 13.30	13.30 - 14.00	14.00 - 14.30	14.30 - 15.00	15.00 - 15.30	15.30 - 16.00	16.00 - 16.30	16.30 - 17.00	17.00 - 17.30	17.30 - 18.00	18.00 - 18.30	18.30 - 19.00	19.00 - 19.30	19.30 - 20.00
Veicoli metano/GPL/ZEV - contrassegni A, DSG, DSV, DSI, F, DSI	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Veicoli ECO - contrassegno DSV, DSI	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Veicoli ECO - contrassegni A, DSG, F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Veicoli NON ECO - contrassegni A, DSG, DSV, DSI, F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

THE VAN SHARING PROJECT - Actions in progress

Phase 2b. Van Sharing Project

The Van Sharing is a project of the Municipality of Bologna with the financial support of the Regione Emilia-Romagna.

- Actions for freight operators
- made on a technological platform
 - based on conceptual (virtual) unified centre
 - physically distributed architecture
 - new consortium of small operators



Provincia di Bologna



COMUNE DI BOLOGNA

Features:

- Trip programming and connection to real time Traffic Control Centre via On Board Equipment
- Advanced Vehicle Monitoring for a fleet network
- Rationalisation of load/unload procedures
- At least 30 vehicles fuelled by CNG
- Reserved parking slot remote booking and enforcement



Route Planning, Loading Factor Optimisation, Park Booking



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European Union
European Regional Development Fund



Made possible by the INTERREG IVC programme

THE VAN SHARING PROJECT - Actions in progress

Phase 2b. Van Sharing Project

State of the art:

- vehicles' acquisition and the Van Sharing platform management have been awarded to TPS - Interporto; the Van Sharing platform is already active (test phase)
- some operators already use the Van Sharing platform by means of the dedicated website
- the bookable loading bay system is in a technical on road testing phase. Two loading bays have been introduced outside the city centre: they are active and available for the system



FREIGHT DISTRIBUTION AND EUROPEAN PROJECTS

CIVITAS MIMOSA - started on Oct. 2008

EC financed project (2008-2012) aimed at implementation and demonstration of integrated activities for the sustainable mobility in the metropolitan areas (7th Framework Programme)

Policy Theme	Sub-Theme
WP1 - Alternative fuels & clean vehicles	Alternative fuels
	Promotional policies
WP2 – Collective passenger transport	Fare/ticket integration
	Park&Ride
WP3 – Demand management strategies	Road pricing strategies
	Parking policies
WP4 – Mobility management, marketing, communication & education	Mobility management policies
	Marketing & communication
WP5 – Safety and Security	Policies for safety & security
WP6 – More energy-efficient vehicle use	Car sharing
	Smart & innovative services
WP7 – Energy efficient freight distribution	Freight logistics
WP8 – Innovative transport telematics systems	Technology for enforcement
	Traffic control & management



Cities involved:

Bologna (IT) - Coordination, Utrecht (NL), Gdansk (PL), Funchal (Madeira - PT) and Tallin (EST)

Partners in Bologna:

Comune di Bologna, ATC, SRM, Regione Emilia-Romagna

Measures scheduled: about 70

Measures in Bologna: 17

SMARTFREIGHT PROJECT



Smart freight transport in urban areas

- Collaborative Project, ICT Programme
- Partners: SINTEF - Coordinator, Q-Free and Norwegian Road Administration (Norway); ETRA and Asoc. Desarrollo de la logistica (Spain); Comune di Bologna (Italy); University of Southampton (UK); Dublin Transportation Office (Ireland); Chalmers University (Sweden); POLIS (Belgium)
- Total Budget - € 3.0 mill (funding € 2.2 mill)
- Budget for the Municipality of Bologna: € 66,500.00 (funding € 44,000.00)
- Duration: 01.01.2008 - 31.12.2010

Objective

Research, develop and test an open Information Communication Technology system (ICT) for freight distribution in urban areas

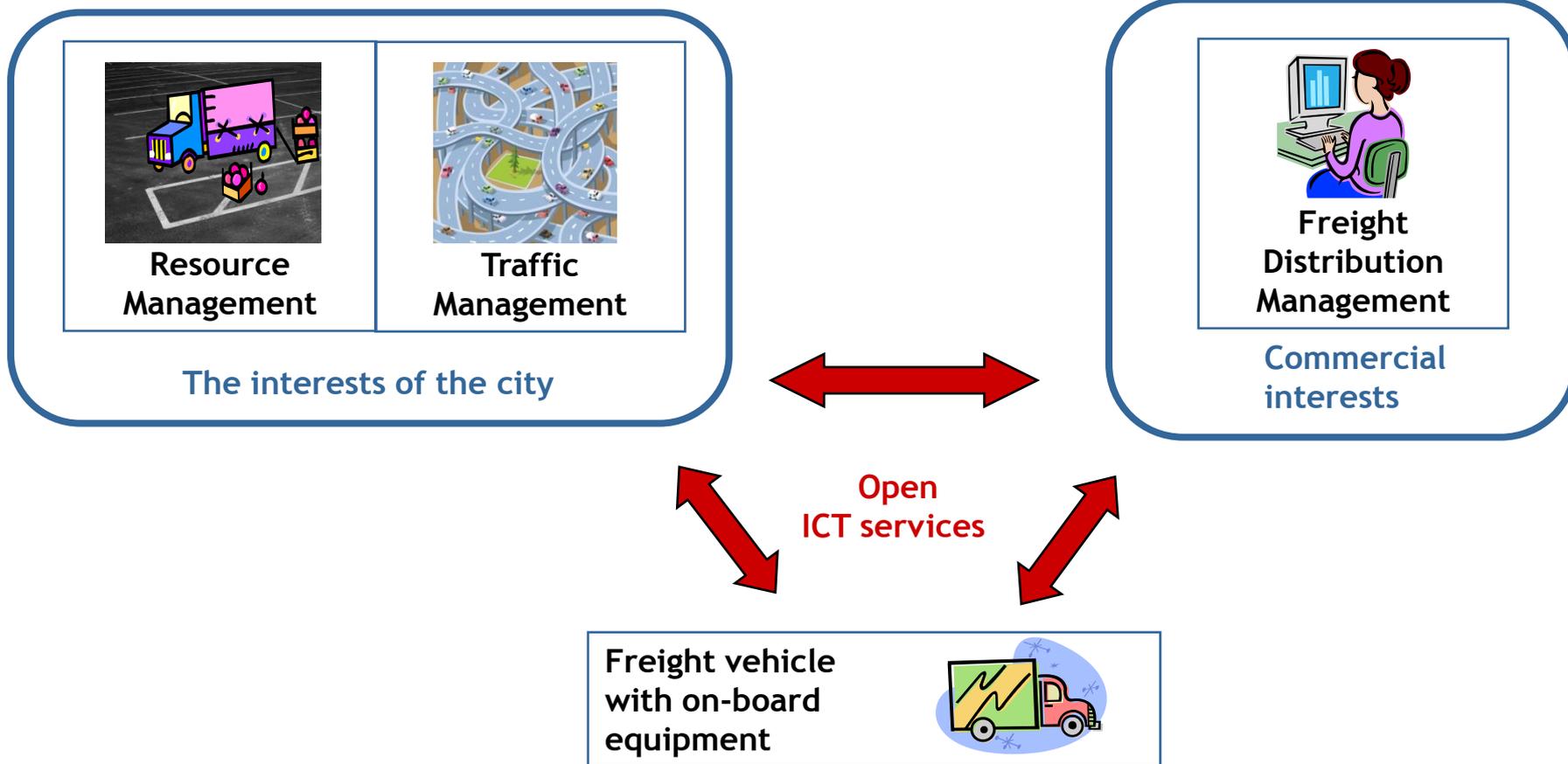


- Coordinate freight distribution operations within a city and develop new traffic management measures towards individual freight vehicles through:
 - open ICT services;
 - on-board equipment;
 - integrated wireless communication infrastructure
- Improve the interoperability between traffic management and freight distribution systems

SMARTFREIGHT PROJECT



Objective



Test sites --> Simulations

Site	Focus
Trondheim	Technical solutions on top of CALM infrastructure: - Enabling new solutions and practices
Dublin	Desktop studies/simulations: - Implementation strategies - Effects on freight distribution in cities
Winchester	
Bologna	

Trondheim --> the use of just one technical test site reduces costs related to infrastructure establishment

Dublin, Winchester, Bologna (test sites) --> simulations:

- contribution to the fulfillment of the objectives of the project
- show the capabilities of the technical solutions
- evaluate how the technical solutions can support:
 - a) the needs of different cities
 - b) new solutions and procedures related to freight distribution in cities
 - c) different implementation strategies

Test sites --> Simulations

Site	Focus
Trondheim	Technical solutions on top of CALM infrastructure: - Enabling new solutions and practices
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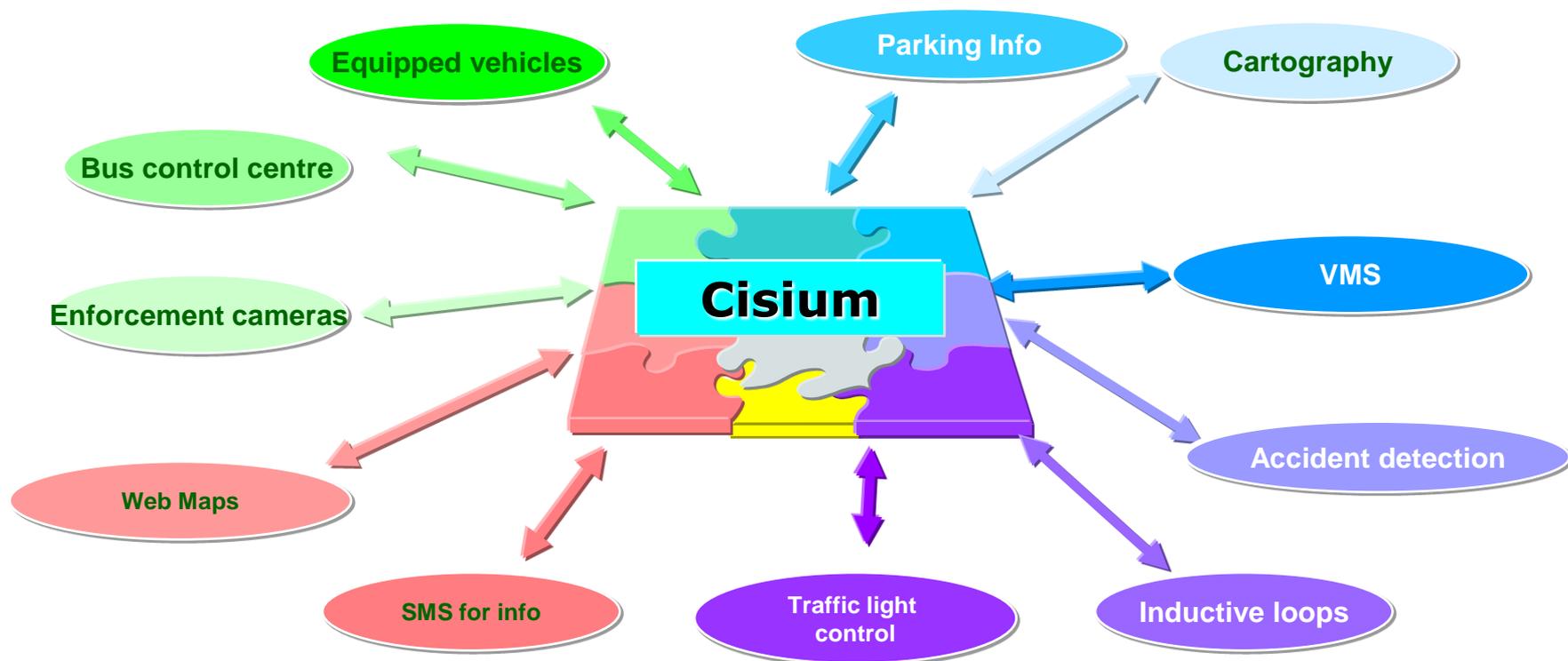
The city of Bologna has been considered an ideal test site because it can take advantage of some systems to simulate Smartfreight scenarios and solutions:

- Traffic Control Centre (CISIUM)
- Van Sharing Project - platform useful to simulate the Smartfreight system

Implementation of such systems is currently in progress, but some functions are already active and they have been useful enough to realise the Smartfreight simulation

CISIUM - TRAFFIC CONTROL CENTRE IN BOLOGNA

CISIUM: an integrated platform in a distributed environment to manage and integrate a set of instruments for traffic planning, control and monitoring



CISIUM - TRAFFIC CONTROL CENTRE IN BOLOGNA

CISIUM platform integrates: georeferencing tools (cartography), models of traffic prediction, event management and the Travel Planner tool

Main functionalities:

- Centralised traffic light control (sensors and traffic light equipment)
- Integration with the Limited Traffic Zones/bus lanes control gates
- Integration with the real time bus control centre for bus prioritisation
- More than 40 Variable Message Signs
- Real Time Traffic Information on web, sms, email, satellite GPS car navigator systems

Main benefits:

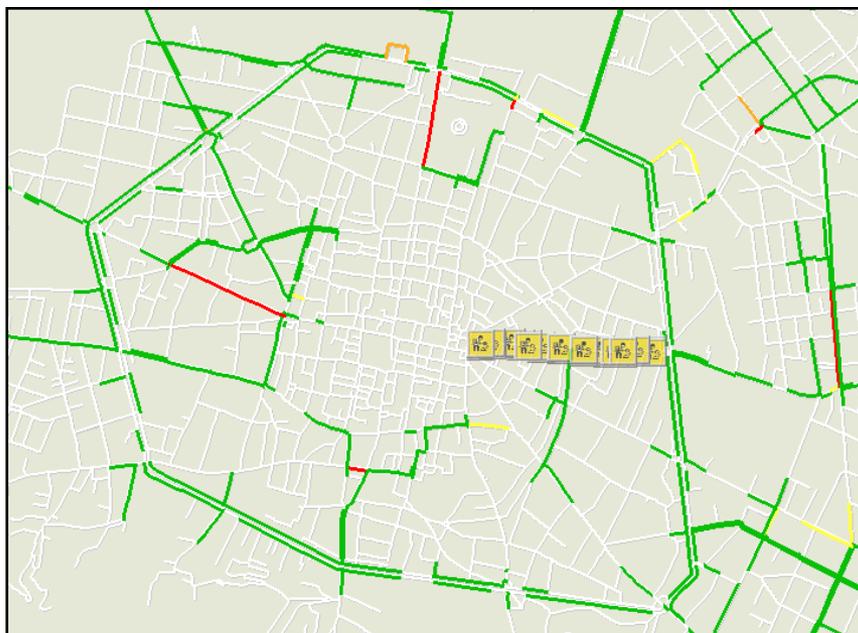
- Real time traffic monitoring
- Powerful tool for traffic planning
- Real time information for road users



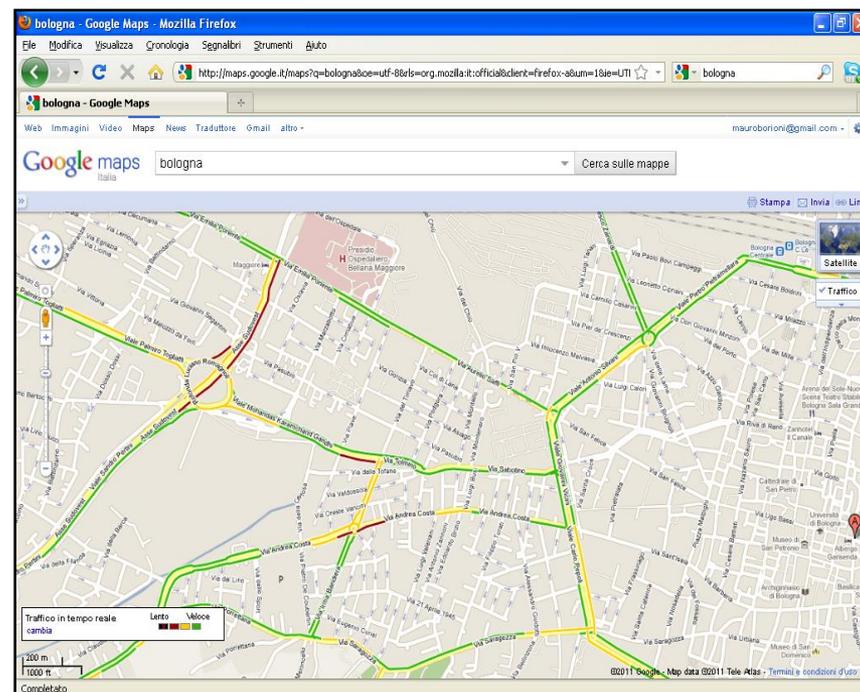
CISIUM - TRAFFIC CONTROL CENTRE IN BOLOGNA

Example of CISIUM outputs

real-time image of road events and roads' level of service



real-time information available also within Google Maps



VAN SHARING AND SMARTFREIGHT SIMULATION IN BOLOGNA

Van Sharing output - a dynamic Delivery Plan

Despite the Van Sharing project (and the Cisium platform) is not yet completed, functions already active have been useful enough to realise the Smartfreight simulation.

Each operator joining the consortium can receive via on-board equipment a dynamic Delivery Plan that indicates:

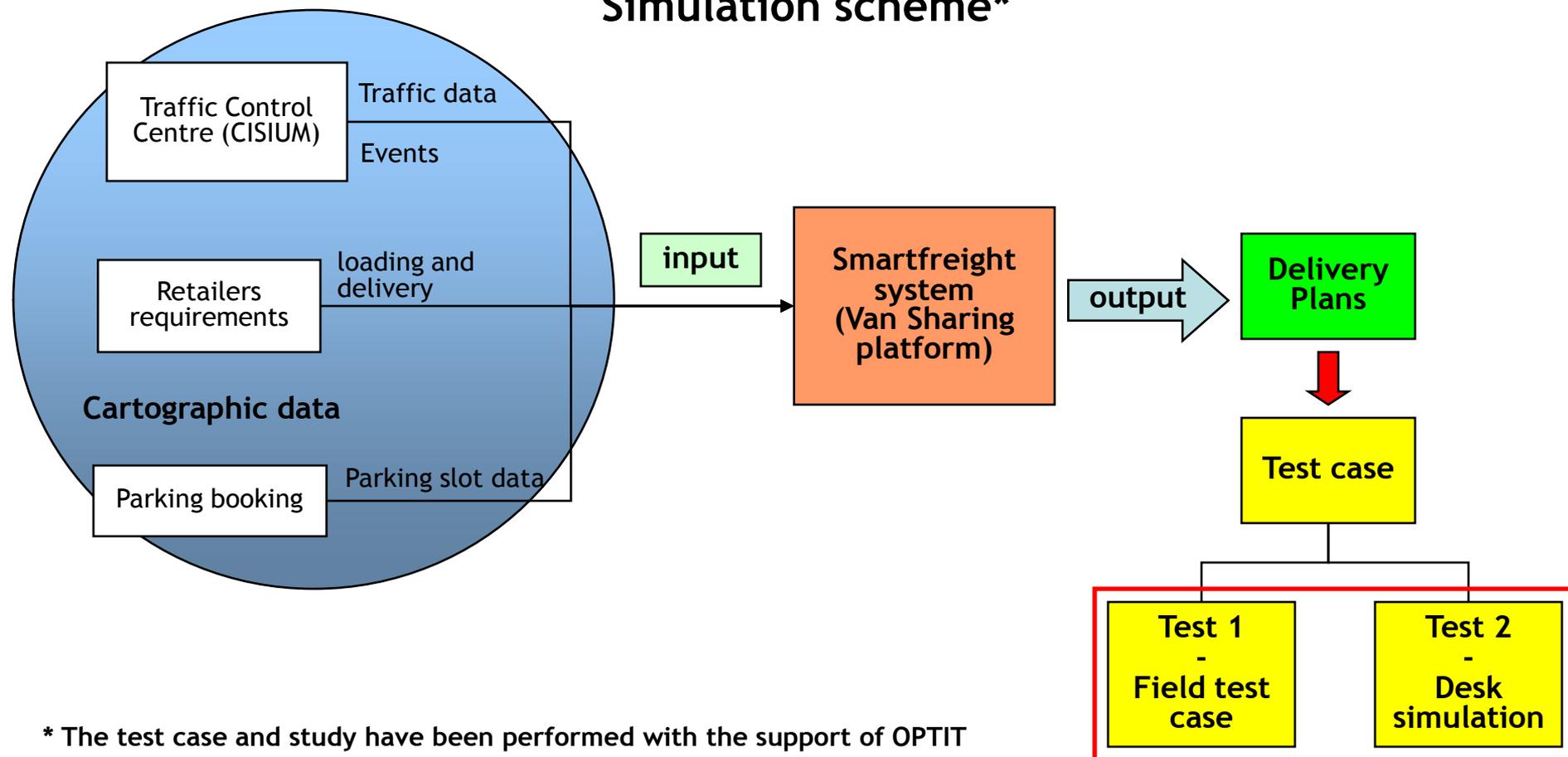
- what goods it has to pick up and the size;
- the list of cross-docking facilities where to load goods;
- the list of retailers where to deliver goods;
- the list of loading bays assigned and the time when they are booked and available for it;
- a routing plan/trip scheme to be followed by the freight vehicle.



Such a procedure fits with the Smartfreight concept and the simulation expected in Bologna. In all purposes, the Van Sharing system and the Smartfreight concept are similar regarding objectives, procedures and functionalities: that is why the Van Sharing system has been chosen to prove the Smartfreight solutions in Bologna and to evaluate effects of its eventual implementation in the city

SMARTFREIGHT SIMULATION IN BOLOGNA

Simulation scheme*



* The test case and study have been performed with the support of OPTIT

Test 1 - Field test case

Field testing by means of the Van Sharing platform and data collected by real case of delivery



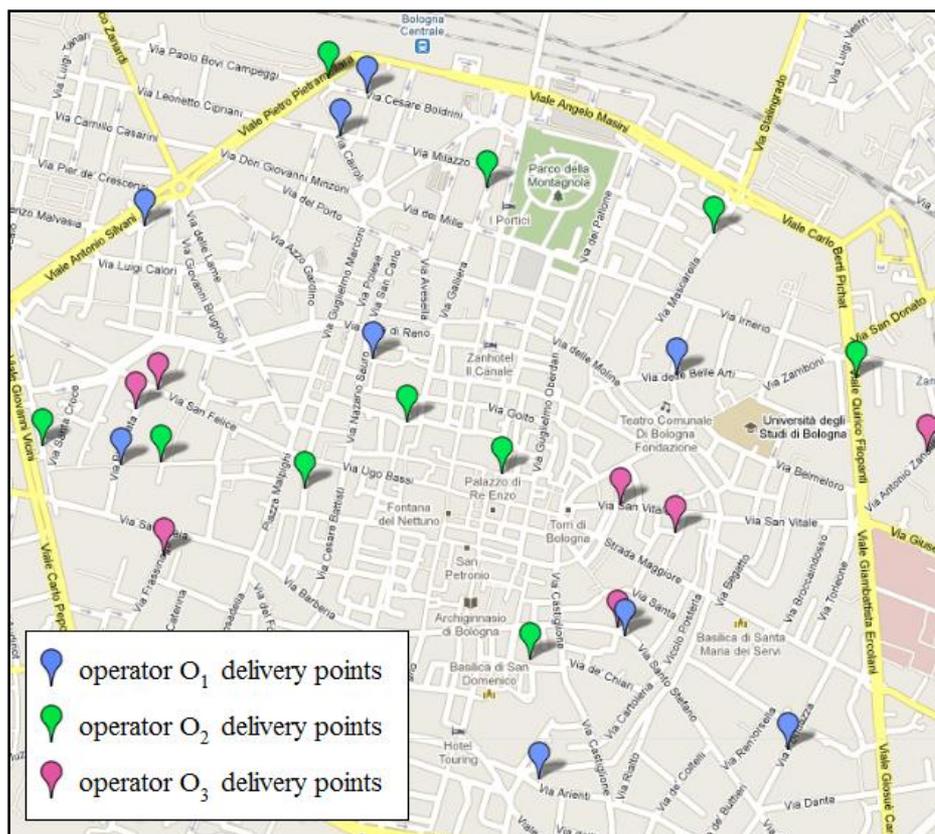
- designing of a “before case” --> Three different operators (O1, O2, O3) perform independently their set of delivery orders (supported by a simple route optimization tool)
- designing of an “after case” (simulation of Smartfreight architecture implementation) --> the same set of orders is performed by a Van Sharing vehicle, using the actual platform to conduct route planning
- comparison in terms of:
 - a) overall time spent
 - b) overall distance travelled
 - c) number of accesses to the city centre



SMARTFREIGHT SIMULATION IN BOLOGNA - TEST 1



Test 1 - Field test case: delivery points localisation and operators scheme



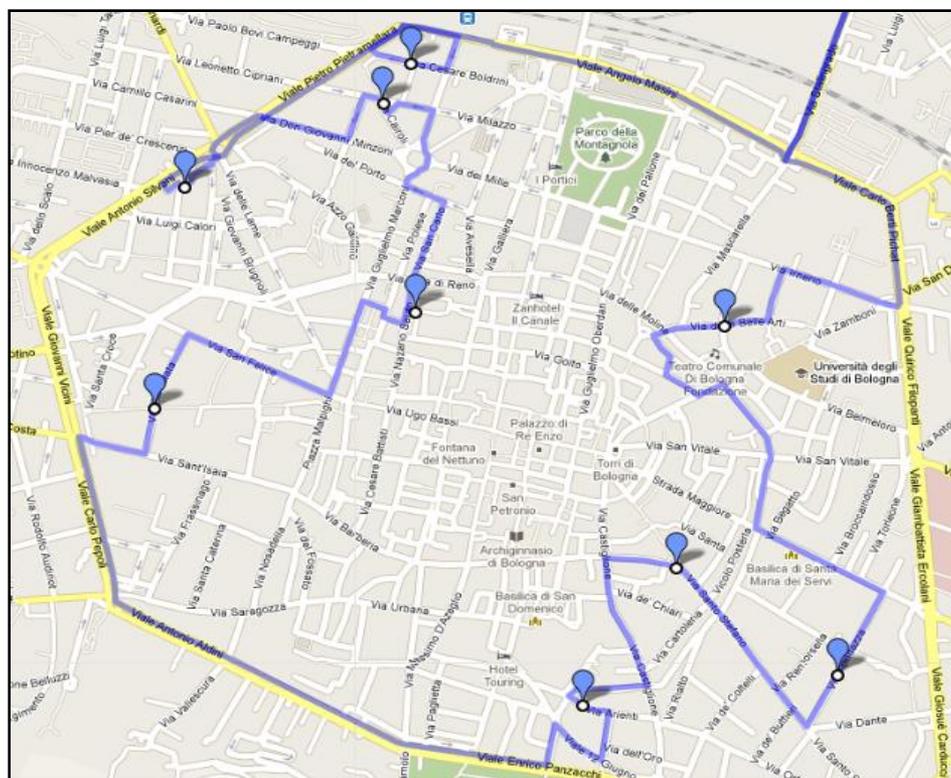
code	retailer address	load details			original operator
		units	parcels	kg	
1	Via delle Belle Arti, 21	1	7	66	operator O ₁
2	Via Pompeo Scipione Dolfi, 4	1	3	34	
3	Via Arienti, 37	1	4	32	
4	Via Schiavonia, 11	1	3	32	
5	Via Santo Stefano, 25	1	4	40	
6	Via del Pratello, 64	1	3	32	
7	Via Cairoli, 3	1	3	19	
8	Via Cesare Boldrini, 16	1	2	7	
9	Via Fondazza, 55	1	4	30	
10	Via Galliera, 66	1	5	49	operator O ₂
11	Via Alfredo Testoni, 5	1	6	47	
12	Via de' Poeti, 5	1	4	34	
13	Viale Pietro Pietramellara	1	5	33	
14	Via Monaldo Calari, 7	1	4	32	operator O ₂
15	Via del Pratello, 45	1	5	41	
16	Via Parigi, 4	1	3	31	
17	Viale Quirico Filopanti, 4	2	11	99	
18	Via Mascarella, 77	1	1	7	operator O ₃
19	Vicolo Fantuzzi, 5	1	3	26	
20	Via Antonio Zanolini, 29	1	4	47	
21	Via Frassinago, 4	1	3	32	
22	Via San Vitale, 11	1	3	30	
23	Via Pietralata, 17	1	7	74	
24	Via Luigi Carlo Farini, 37	1	1	17	
25	Via San Felice, 48	1	1	10	

SMARTFREIGHT SIMULATION IN BOLOGNA - TEST 1



Test 1 - Field test case: before case

Route plan for Operator 1 - Similar study for other two operators

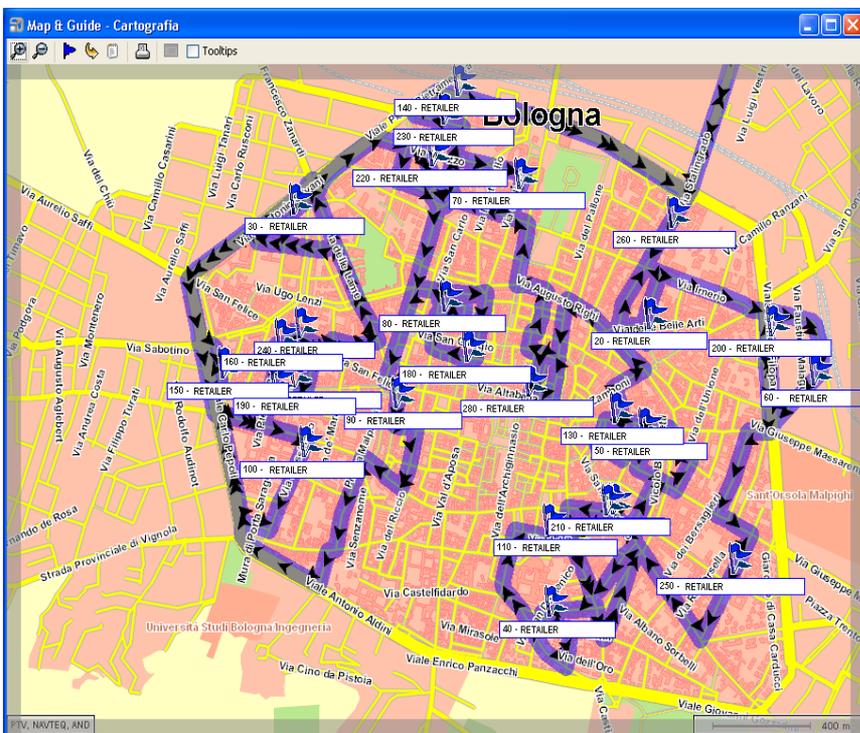


route data	route R ₁
overall distance travelled	49,00 km
whereof in the city centre	12,80 km
overall trip duration	1h 23
whereof in the city centre	0h 36
approximated total unload time	0h 45
total shipment time	2h 08
total time spent in the city centre	1h 21

SMARTFREIGHT SIMULATION IN BOLOGNA - TEST 1

Test 1 - Field test case: after case

Route plan for the unique Van Sharing operator --> optimised route



retailer		
order	code	address
1	18	Via Mascarella, 77
2	1	Via delle Belle Arti, 21
3	17	Viale Quirico Filopanti, 4
4	20	Via Antonio Zanolini, 29
5	9	Via Fondazza, 55
6	2	Via Pompeo Scipione Dolfi, 4
7	12	Via de' Poeti, 5
8	24	Via Luigi Carlo Farini, 37
9	5	Via Santo Stefano, 25
10	3	Via Arienti, 37
11	22	Via San Vitale, 11
12	16	Via Parigi, 4
13	4	Via Schiavonia, 11

retailer		
order	code	address
14	11	Via Alfredo Testoni, 5
15	21	Via Frassinago, 4
16	15	Via del Pratello, 45
17	6	Via del Pratello, 64
18	14	Via Monaldo Calari, 7
19	23	Via Pietralata, 17
20	25	Via San Felice, 48
21	19	Vicolo Fantuzzi, 5
22	7	Via Cairoli, 3
23	10	Via Galliera, 66
24	8	Via Cesare Boldrini, 16
25	13	Viale Pietro Pietramellara

route data	route	V
overall distance travelled	72,00	km
whereof in the city centre	35,80	km
overall trip duration	2h 28	
whereof in the city centre	1h 41	
approximated total unload time	2h 10	
total shipment time	4h 38	
total time spent in the city centre	3h 51	

SMARTFREIGHT SIMULATION IN BOLOGNA - TEST 1



Test 1 - Field test case: results comparison before and after

		before case solution	after case solution	percentage comparison
number of accesses to the city centre		3	1	-66,67%
overall distance travelled	km	146,35	72,00	-50,80%
whereof in the city centre	km	37,75	35,80	-5,17%
overall trip duration		4h 05	2h 28	-39,59%
whereof in the city centre		1h 44	1h 41	-2,88%
approximated total unload time		2h 10	2h 10	
total shipment time		6h 15	4h 38	-25,87%
total time spent in the city centre		3h 54	3h 51	-1,28%



Evaluation of benefits obtained in terms of:

- a) overall distance travelled: - 50,8% (- 5,2% considering only the city centre)
- b) overall trip duration: - 39,6% (- 2,9% considering only the city centre)
- c) overall time spent: - 25,9% (- 1,3% considering only the city centre)

SMARTFREIGHT SIMULATION IN BOLOGNA - TEST 2



Test 2 - Desk simulation

A desk simulation, supported by a generic route optimization tool, to account for a more complex mix of pick-up and delivery points and introducing van capacity constraints, which confirms the benefits of freight flow aggregation

		before case solution	after case solution	percentage comparison
number of vehicles accessing the city centre		5	2	-60,00%
overall distance travelled	km	125,20	102,80	-17,89%
whereof in the city centre	km	33,55	23,50	-29,96%
overall trip duration		3h 35	2h 42	-24,65%
whereof in the city centre		1h 39	1h 05	-34,34%
approx. total load/unload time		2h 40	2h 40	
whereof in the city centre		1h 30	1h 30	
total shipment time		6h 15	5h 22	-14,13%
total time spent in the city centre		3h 09	2h 35	-17,99%



Evaluation of benefits obtained in terms of:

- a) overall distance travelled: - 17,9% (- 30,0% considering only the city centre)
- b) overall trip duration: - 24,7% (- 34,3% considering only the city centre)
- c) overall time spent: - 14,1% (- 18,0% considering only the city centre)



CONCLUSIONS

Lesson learnt and future steps

- first steps of Van Sharing system and simulation realised within the Smartfreight project showed substantial room for improvement in city logistics: technologies used and tested are very effective and responsive to technical requirements
- studies and research activity carried out within the Smartfreight project provided valuable information on the freight distribution scenario in the city
- Smartfreight and Van Sharing interrelated and shared data and results: they have improved and calibrated each other, in the framework of goods delivery management policies carried out by the Municipality of Bologna
- the Cisium platform and the Van Sharing project will be soon completely accomplished and the freight delivery optimisation will be definitely implemented

CONCLUSIONS

but Open questions

- The small operators that joined the consortium are still quite few, because of:
 - fear to loose their own market shares
- The potential customers are still few because of:
 - bigger costs of the service in start up phase (+30%) are a barrier
 - distrust toward the scheme proposed, the added value is not well perceived
 - the current service performed by small operators is very flexible and appreciated

Some remarks:

- Introducing a more efficient system cause a decrease of the total value of this market:
Less Km driven --> less trips --> less revenues for operators
- Difficult to reach the critical mass and to force this scheme

A new business model is needed

- What the role of the public bodies should be?
- How to internalise social and environmental costs?



Thank you

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