Bus with High Level of Service
TU 603

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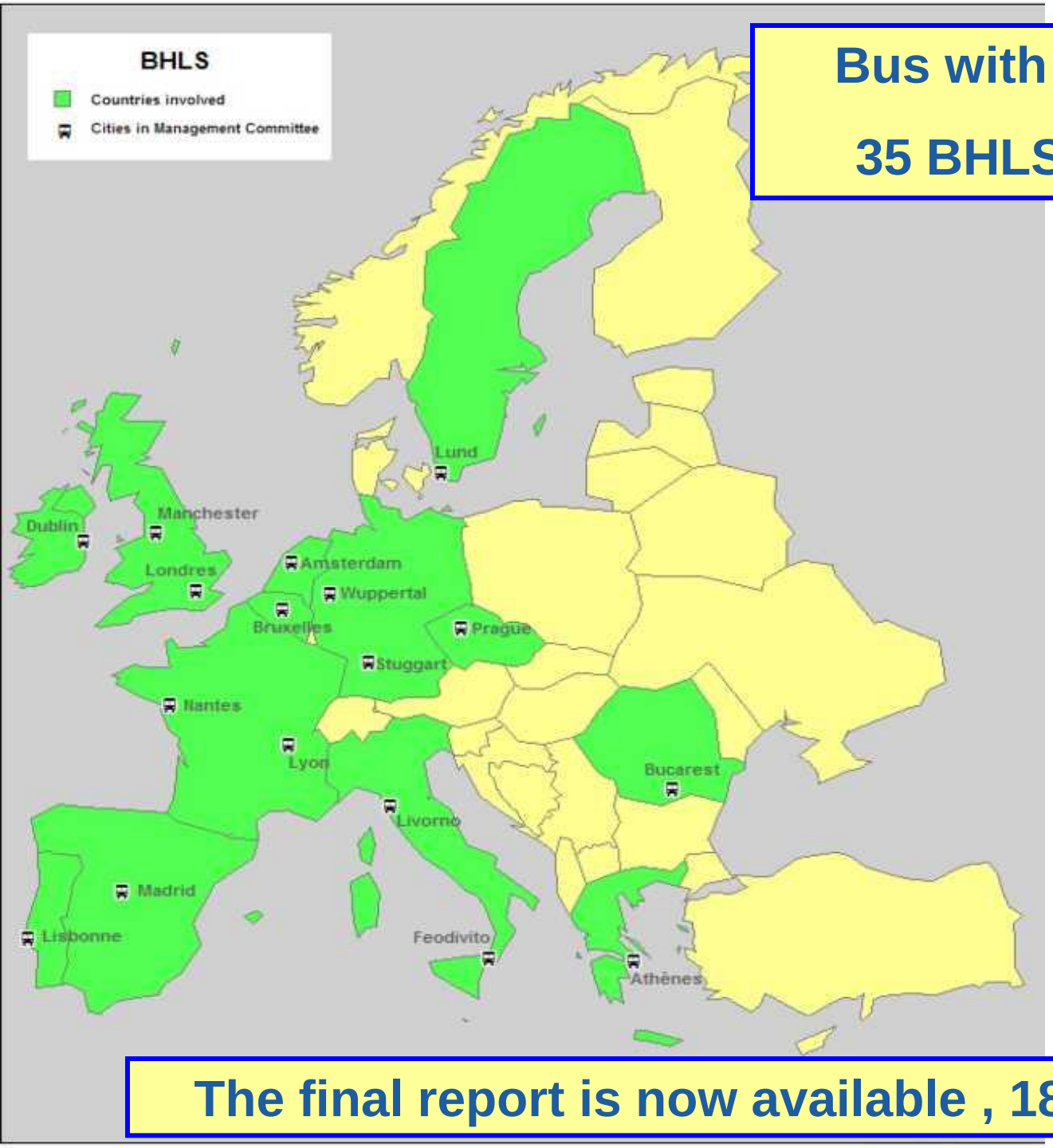
Year: 4

Arno KERKHOF – UITP / Brussels - **François RAMBAUD -** CERTU / Lyon



Bus with High Level of Service

35 BHLS analyzed, 25 visited

14 EU countries

Belgium, Czech Republic, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Romania, Spain, Sweden, Switzerland and United Kingdom

Duration: 2007 – 2011

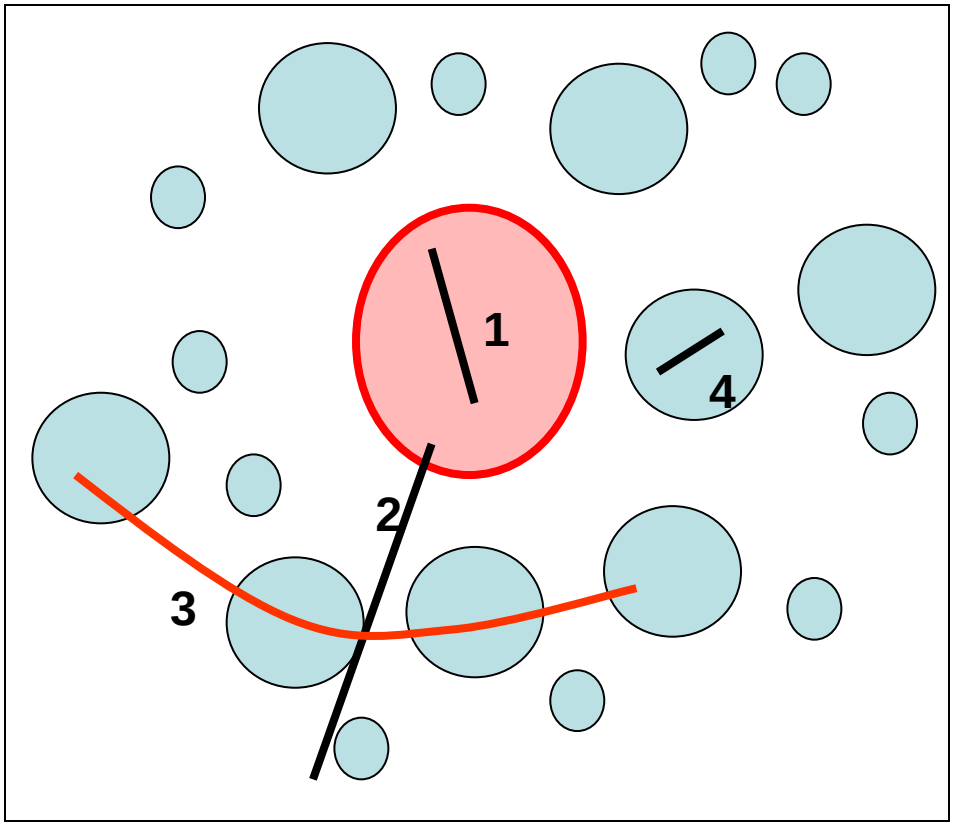
www.bhls.eu

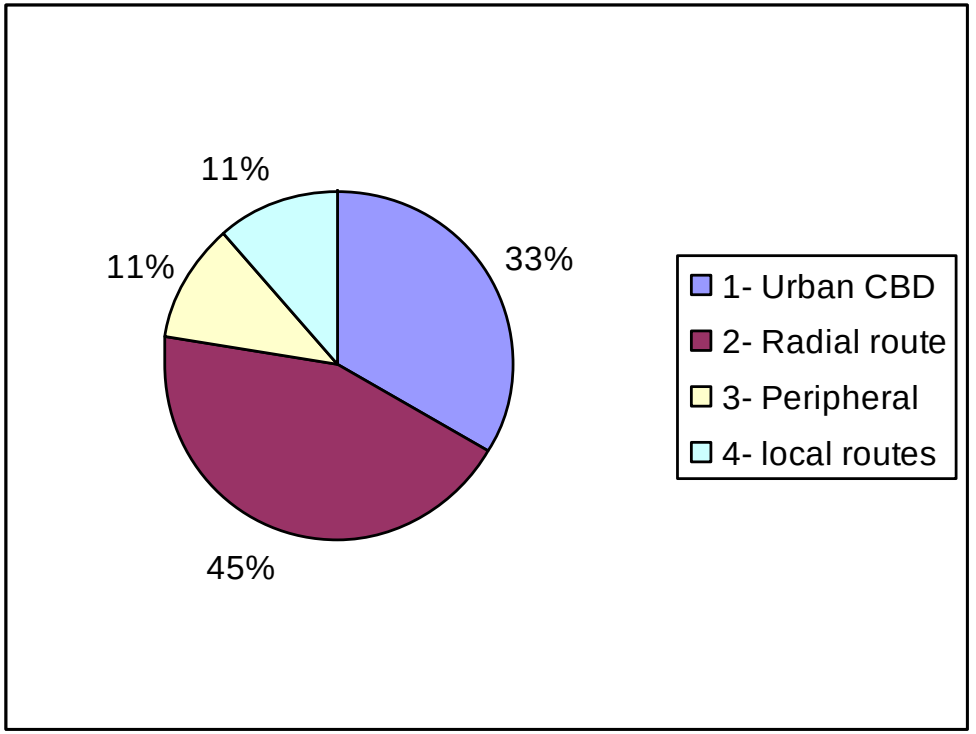
The final report is now available , 180 pages with a CD

Scope

- Introduction : the “system” approach …
- A wide spectrum of solutions
- Some views from the state of the art
  - *On infrastructure (running ways, stations, bike parks,…*
  - *On ITS (always for the passengers, CCTV, protection, priority*
  - *On vehicle (design)*
- Key results (regularity, modal shift, frequency, commercial speed)

A wide spectrum of BHLS solutions





- **A wide spectrum of solution,**
- **Into different urban context**
- **Several objectives, different strategies, different effects**

Infrastructure : the most challenging sub-system the most expensive

RoW	Internal impacts: On the network	- Capacity - modal shift (from car, other lines)
	External impacts	- Mobility (constraints VP,…) - Urbanism, economy, social - Pollution / GES - City image

A

B

C

Zuidtangent (Amsterdam)

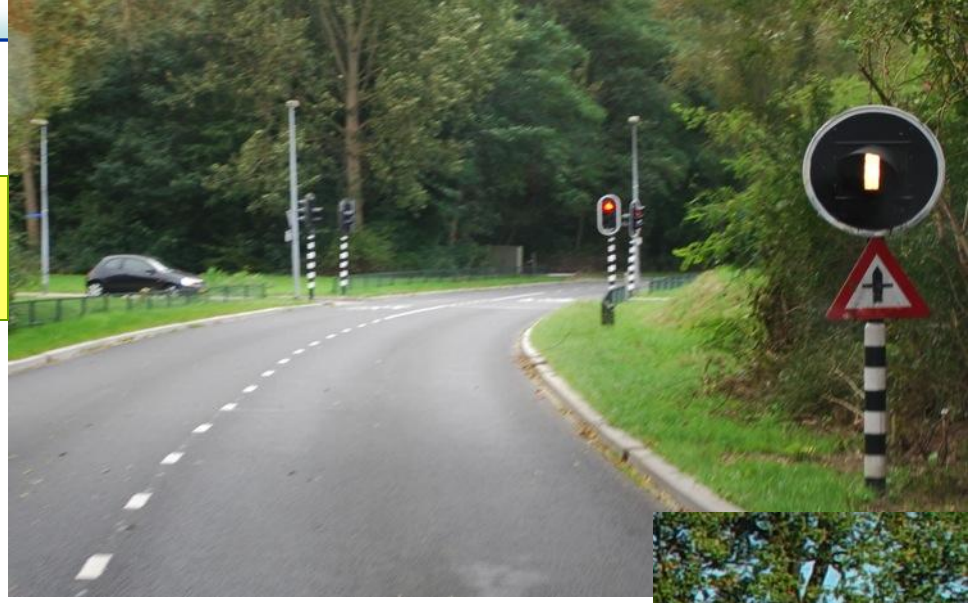
Configuration type « A »

Where it is needed

TVM (Paris)

Lund, underway for bus et bikes

Almere: priority, that control the speed at 40 maximum

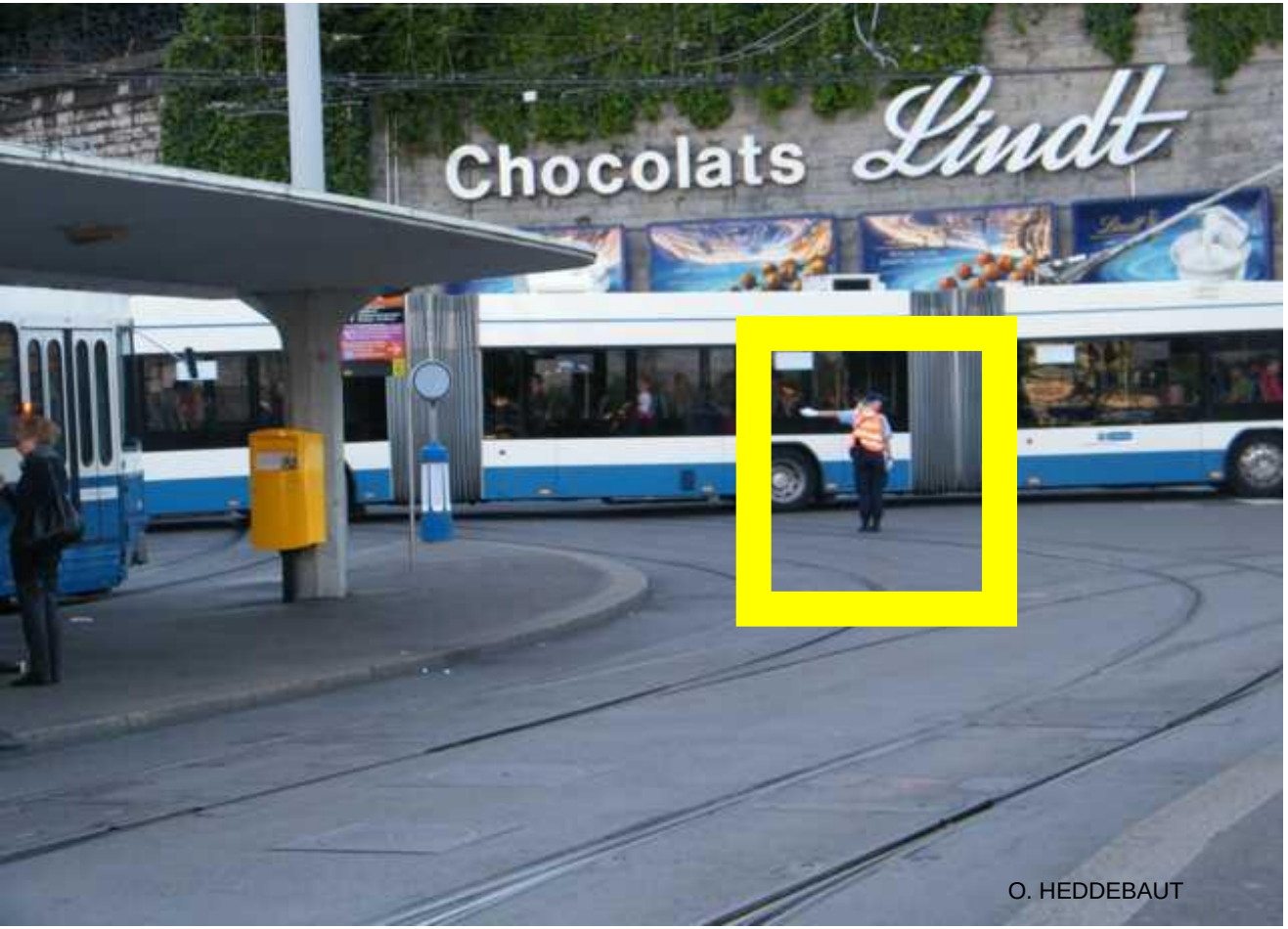


Priority at all crossing :

- *a tool for regularity*
- *a tool for a better comfort*
- *a tool for fuel economy*
- *at last for a better speed*

Twente, crossing without traffic lights

Priority at traffic lights, an important tool … easier with a police man in city centre



Cycle and pedestrian path

Safety barriers for crossing a rapid BHLS (70 Km/h)

Dense areas, where trade offs are inevitable :

- *Zone 25 in Hambourg, a commercial street*

- *Zone 30 in Lorient city centre, shared with bikes*

. BHLS should have the same priority rule as a tram

Hamburg

Lorient

Oberhausen

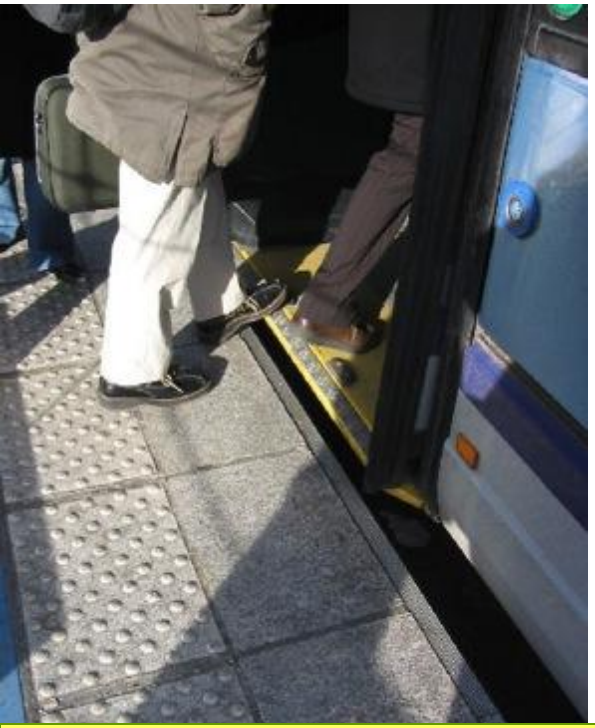
Common lanes « tram and BHLS » :

- *trade offs with accessible kerb height*
- *interest to have common priority rules*

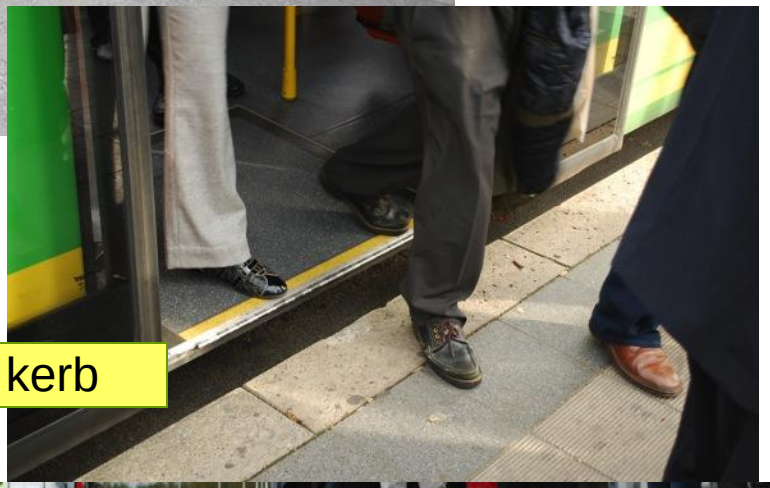
Gothenburg

A manual ramp in SE, D, NL …

Stockholm, on low kerb



Rouen, Optiguide system with high kerb



Oberhausen, high kerb

Zuidtangent, high kerb

Almere

Important use of concrete, in Germany, Sweden, Uk, CH, NL :

- *To fight pavement rutting*
- *To decrease maintenance costs*
- *Visual differentiation*

Twente

Intermodality (Cycling) : a key factor in UK, Sweden, NL

BHLS trends on motorways

- **Only a few examples in Europe**
  - Zuidtangent (Amsterdam); 5 km on emergency lane
  - Madrid : 16km in the middle of the motorway A-6
  - Dublin : M7, bus lane in hard shoulder

- **An emerging market …**

Zuidtangent

Madrid: 200 bus/h

ITS tools for a high comfort and security...

Cambridge

1.- CCTV with cameras inside and outside the vehicle (6 or 8 in total)

2.- Plug and WIFI inside BHLS buses (Fastrack and Cambridge)

3. - Internet screen at station (Fastrack)

CCTV

Fastrack bus : plug and WIFI

Fastrack

Dynamic information, at all stations

A specific bus market for heavy BHLS schemes …

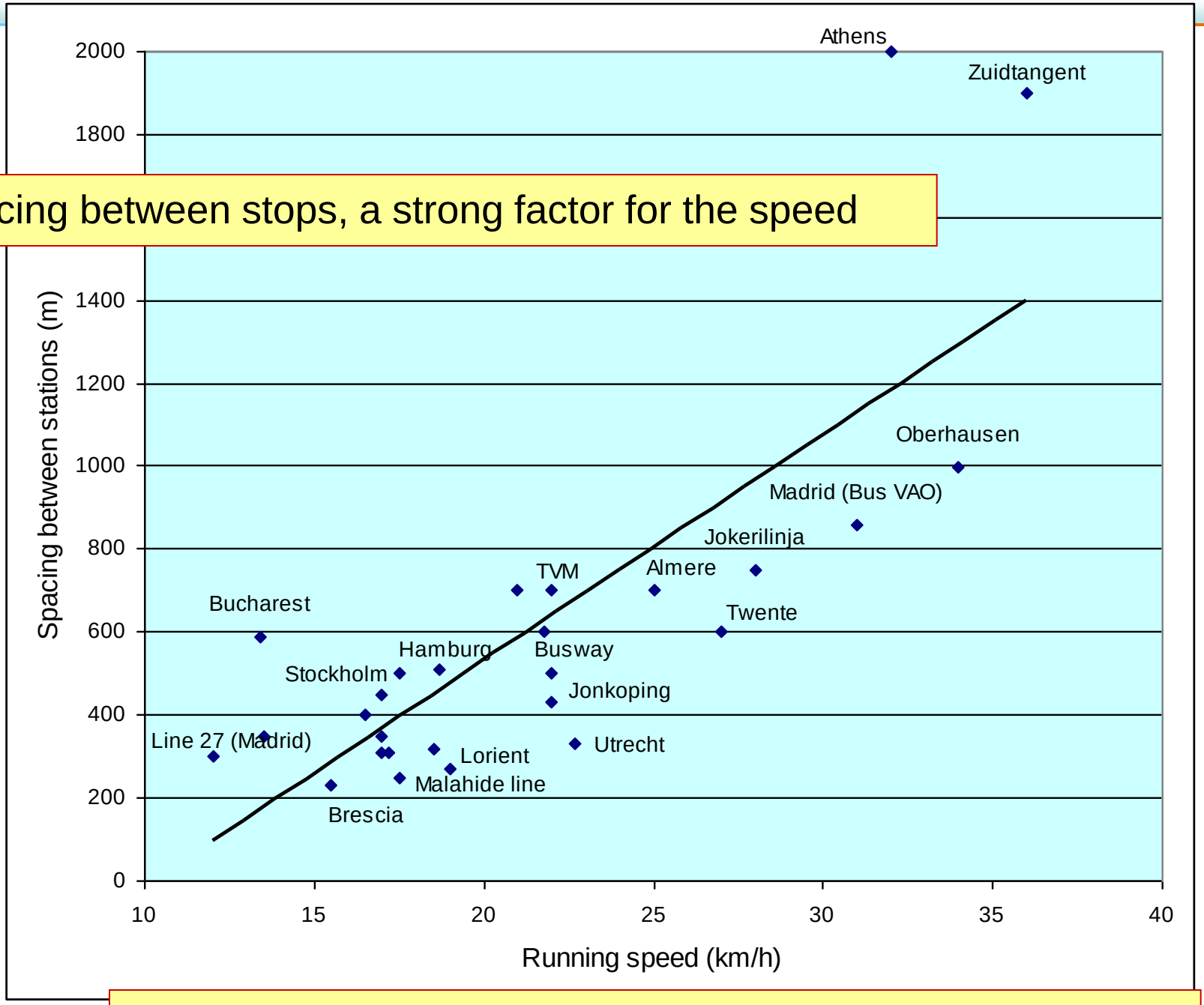
By Irisbus, the Crealis

For the project of Nimes (2012)

By Wright

For Leeds and other cities

Spacing between stops, a strong factor for the speed

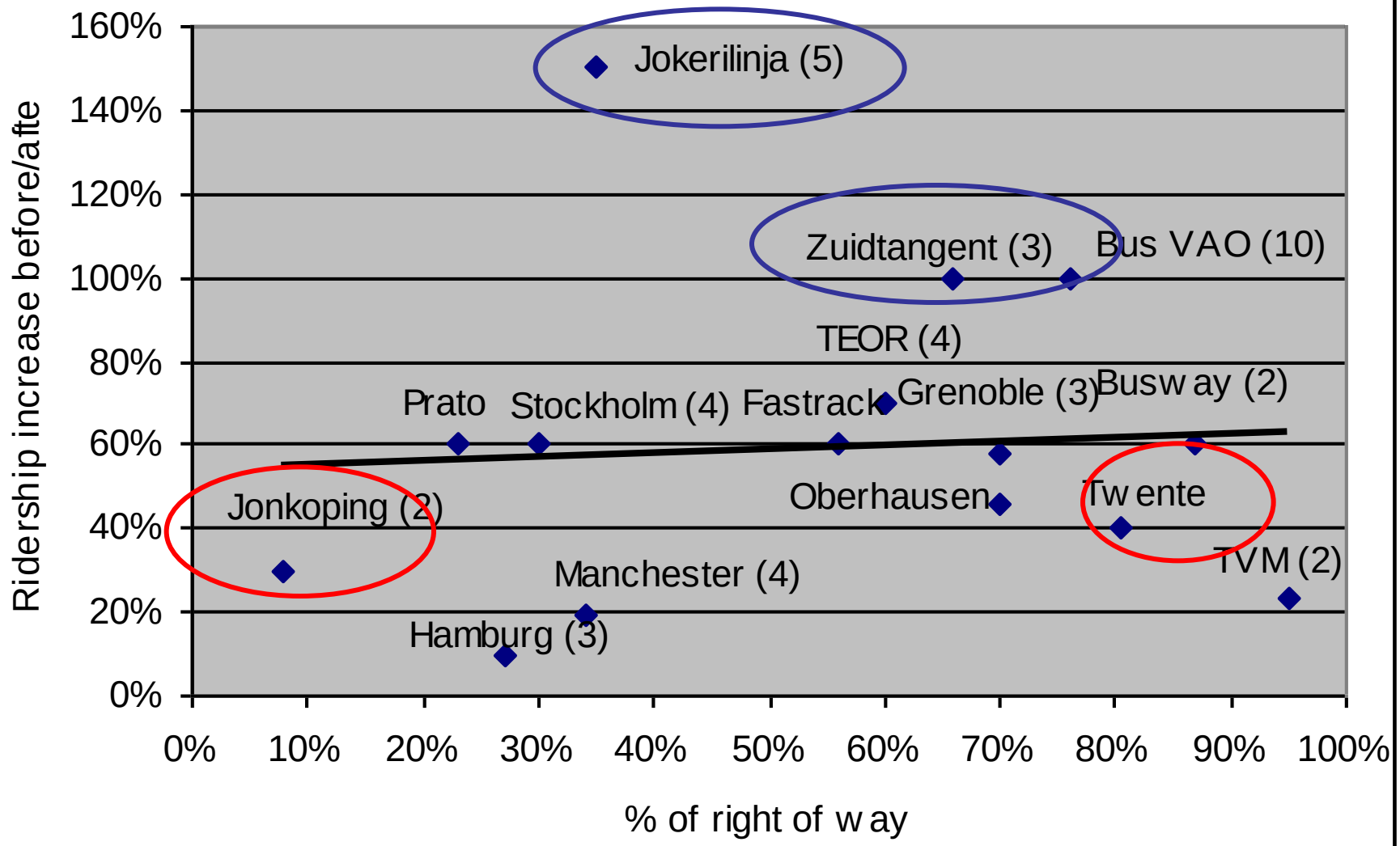


The strong economical factor : distance between stops

COST is supported by the EU RTD Framework Programme
vides the COST Office through an EC contract

Always an increase of ridership …

No link between increase and % of dedicated lane…



The ridership increase always on several years…

Modal shift: different results according to the context

	Trips coming from the car	Trips coming from biking	From other modes
Busway (Nantes)	30%		
Fastrack (Kent Thameside)	19%		
Malahide corridor (Dublin)	17%		
Line 11 and 12 (Utrecht)	15%		
Bus VAO corridor , all lines (Madrid)	15%		
The Jokerilinja 550 (Helsinki)	12%		
TVM (Paris)	8,50%		
3 lines "Citybussarna" (Jönköpping)	6%	5%	13% new trips 1% from special T
Line 2 and 3 (Twente)	6%	24%	
Trunk network (Stockholm)	5%		60% from metro

Regularity / punctuality : some results achieved, according to the EU standard - EN 13 816

	Reliability target (regularity, punctuality)	Threshold achieved	**Observation**
Nantes (Busway)	**90% (i+2min)**	**98%**	High efficiency
Fastrack (B)	**95% (H-1min;H+5min)**	**97,5%**	High efficiency
Twente (line 2, 3)	**80% H-1min;H+5min**	**95 / 97,6%**	Good protection
Paris (TVM)	**90% (i+2min)**	**95,8%**	High load at rush hours
Grenoble (line 1)	**90% (H-1min;H+5min)**	**95**	Good results
Leeds	**95% (H-1min;H+5min)**	**93%**	Low part of RoW
Almere (network)	**80% H-1min;H+3min**	**91,4%**	Calculation with 3 min
Gothenburg (line 16)	**80% H-30s; H+3min**	**75%**	High load at rush hours
Prague line 213	**80% (H-0min; H+2min)**	**78 - 86 %**	Low part of RoW

Legend: where i=interval (regularity objective) and H = scheduled time (punctuality objective)

For a high BHLS level : a target by over 90 / 95% is needed

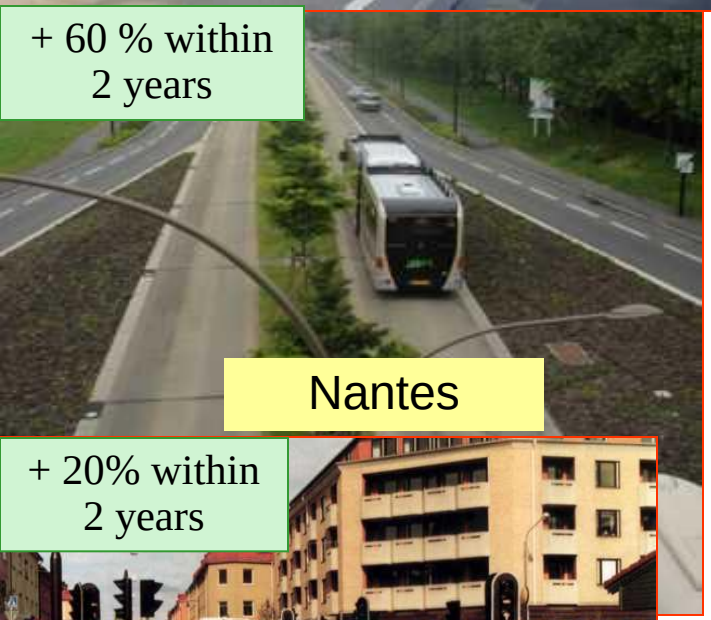
COST is supported by the EU RTD Framework F
vides the contract

First recommendations …

- A strong politician involvement for any BHLS
- A long term vision at network level (Intermodality / hierarchisation)
- Give BHLS buses the same “Tram” priority, with more visible signals
- A better enforcement governance (higher fines, …)

And last but not least:

- To keep operational our “BHLS” Knowledge Network …



Recommendations for a "full or complete" BHLS

Questions? Discussion?

- **Belong to the structuring network** (same schedule span)
- **Right of Way B / A , when needed**
- **Strong intermodality (train, tramway, bus, biking…)**
- **Full IT-solutions : dynamic information at all stops,…**
- **High reliability** (up to 95%, 98% trips having a bus on time)
- **Mostly off bus ticketing** (no ticket selling by the driver)
- **A specific brand/image** (related to the service quality)

ESF provides the
COST Office through an EC contract

Information resources for BRT, BHLS

- COST Action on BHLS
  - www.bhls.eu
- Final report available, CD-ROM includes
  - Final report
  - Presentations from the various BHLS sites
  - Data sheets

Final Report – released November 2011

- Main report
- CD-ROM
  - Descriptions of 20+ BHLS sites
  - Detailed data for the BHLS sites
  - Presentations
  - Working notes, supporting materials
  - Images, photos
  - Publications, articles, workshop materials
  - Total c 500 MB
- Negotiating to place in public domain in structured way to facilitate continuity – legacy website
  -

www.bhls.eu - homepage

cost **BHLS** Buses with High Level of Service

PRIVATE

UNITED KINGDOM

Description

In order to improve sustainable mobility in urban areas throughout Europe, we observe different strategies, such as in Sweden (The trunk network in Stockholm), in England and in Ireland under the name of "Quality Bus Corridor", in France (Bus à Haut Niveau de Service "–BHNS), in Germany (metrobus concept), in the Netherlands (HOV – "Hoogwaardig Openbaar Vervoer"), and a lot of other experiments dealt with "High capacity bus systems".
In order to better understand all these trends and to promote a useful way to enhance the bus image, a COST Action has been decided on this topic and is called:

Buses with a high level of service

ORGANISATION

14 EU countries are involved in this COST action that began in October 2007 and should

NEWS

- **Final conference of this COST action**

20 August 2011
will take place in Brussels, the 29th and 30th of November 2011, integrated in the annual POLIS conference.
The pre-programme

- **The workshop in Switzerland**

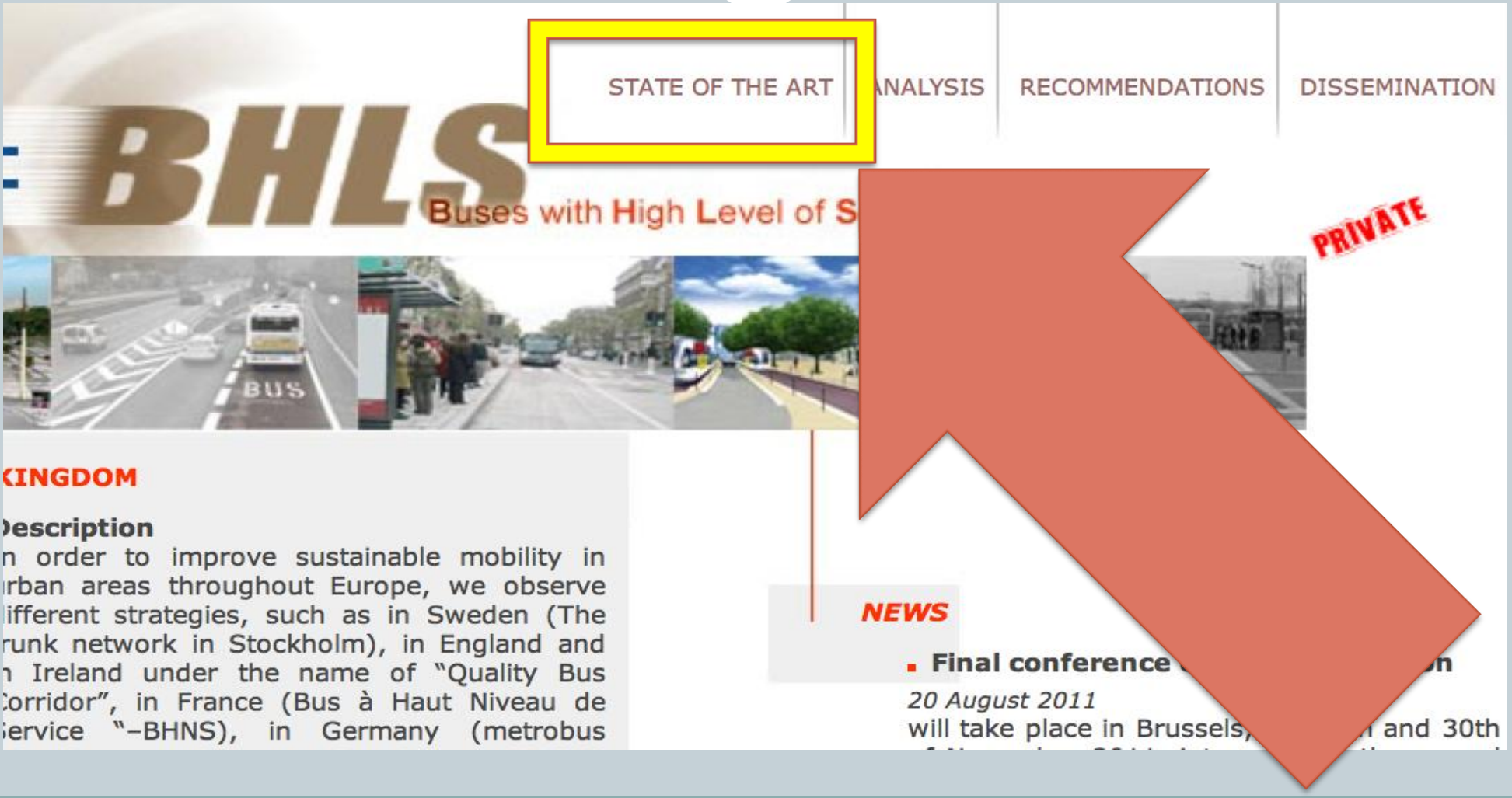
20 May 2011
took place in May 2011 in Zurich and Lucerne; the report of this plenary meeting at this link.

- **EBSF : videos on the first Use Cases**

25 February 2011
Madrid (passenger information) and Rouen (mini ramp on guided bus) - February 2011.
To the *presentations*.

Article in the "Built Environment"

Homepage - detail



State of the Art page

Example - French page

French experiences: Nantes, Lorient, Paris

Nantes, the Busway, line 4

At the terminus in the center:

Along the former highway, south entrance of Nantes:

Information resources for BRT, BHLS

- COST Action on BHLS
  - www.bhls.eu
- Final report available, CD-ROM
  - Dario, Juan-Carlos, Walter, Dennis have the report and CD
  - Report is 10MB, mail request to me at etts@indigo.ie

Findings, Recommendations and Research themes

BHLS has been implemented in …

- Cities of all sizes
  - Major cities, medium-sized cities, small cities
- Cities with different mode configurations
  - Extensive metro/tram, mixed tram/bus, bus dominant
- Different types of routes
  - Urban, radial, peripheral, local, hinterland
- Different regulatory frameworks
  - Public (quasi-) monopoly, city contract, route contract, deregulated

Strong evidence that BHLS ….

- Can be implemented successfully – we can do it!
- Is not restricted to a narrow range of scenarios
- Is highly adaptable
- Can be implemented at lower investment cost and less urban impact than rail systems

BUT !!!!!!

- This does not mean that BHLS is the most suitable choice in all circumstances
  - BHLS is just one of a number of options
  - The point is that there is almost always a good BHLS option
  - Let the alternatives analysis and appraisal determine outcome
- There can be challenges, and they can be significant
  - *Barriers*: These can be the 'show-stoppers', may be arbitrary
  - *Technical challenges*: These can be serious constraints
  - *Design and implementation*: Normal stuff - need planning, expertise, resource and hard work

Potential Barriers

- Difficulties to sell a BHLS project to all stakeholders, including the citizens
  - Ingrained preference for rail-based modes
  - Lack of understanding of what is possible
  - Poor image of bus
- Difficulties to gain the required right of way, or especially priority over cars
  - Need skilled authority to recognise genuine concerns, stand up to blocking tactics, and guide through approval processes
- Organisational and regulatory barriers
  - Strangely enough, not an issue (see Thredbo 11 paper)

Technical Challenges

- Challenges may be:
  - Unique to BHLS
  - Common with tramway and other transit systems
  - Common with ‘normal’ bus projects and operations
  - Intrinsic to any project
- Challenges specific to BHLS include:
  - Designing the required Right of Way, especially core urban area
  - Obtaining required priority at traffic signals
  - Knowledge and skill base

Design and implementation challenges

- Infrastructure
- Bus stations design
- Vehicle design and associated issues
- ITS, in particular AVM
- Marketing and branding
- Hierarchisation
- Urban environment and area around bus stops

Recommendations at EU Level

- Recognise BHLS as a higher-order transit mode
- Develop a framework for defining and rating BHLS
- Continue and develop BHLS knowledge network
- Give ‘tram-level’ priority to BHLS
- Develop efficient RoW enforcement strategies
- Safety issues
- ITS issues
- EU rules on bus sizes

Recommendations at City, Regional level

- Strong political will is essential, at every stage
- Need a long-term vision at city level
- Develop an efficient communication strategy
- Organise visits to other BHLS cities (cities have airports)
- Set up a BHLS management committee
- Develop RoW enforcement capacity
- Be both innovative and willing to compromise in infrastructure and priority levels
- Make sure the first BHLS is a winner!

Research recommendations

1) **Evaluation of benefits and impacts**
2) Design and optimisation of BHLS
3) Quality and regularity measures
4) Improve/assess system approach quality
5) BHLS market knowledge
6) Financing mechanisms for BHLS

Research (1) – Benefits and Impacts

- Transportation system impacts: e.g. modal share, total network effectiveness, transport sector energy consumption and emissions.
- Societal impacts: e.g. access to jobs, social equity, social exclusion.
- Urban impacts and importance for public transport: e.g. land use patterns and urban spatial/economic structure, land values, development, urban economy.
- Economic value impacts: e.g. post-implementation socio-economic CBA, structured impacts analysis.

Research (2) – Design and optimisation

- Optimisation of service plans and operations of BHLS.
- Organisational methods and structures for BHLS.
- To evaluate the efficiency of the available modelling tools, to benchmark the macro, micro analysis.

Research (3) - Measurements

- Enlarge and test several types of indicators and their geographical presentations. Include points of view of authorities, operators and users. Test information on regularity/punctuality towards customers.
- Make benchmarking among operational BHLS systems.
- Develop enhancements, where relevant, to the EU standard on service quality (EN 13816) and to monitor applications and organise feedback.
- Define a set of complementary KPIs. The telediagnostic tools (based on the EBSF IT standardized platform) can provide an important support especially when high frequency has to be guaranteed.

Research (4) – System approach quality

- Assess the AVMS management (quality of data, quality of assessment, information on disturbances).
- Compare BHLS customer satisfaction indicators
- Use of the new information solutions like flash code, social networking like Facebook or Twitter
- New needs for PT and BHLS (Wifi, sockets on buses, information on mobile phones, personal and targeted information, emerging technologies
- On fares issues, willingness to pay more for faster or better services; the impact on fraud management.

Research (5) – BHLS Market knowledge

- Role of BHLS within a PT network (planning, organisation, inter-modality, multimodality, etc.).
- Image of BHLS (e.g. why tram is considered so exiting and not bus?).
- Public participation and acceptance.
- Sharing data basis for network comparisons.

Research (6) – financing mechanisms

- Financing mechanisms for BHLS infrastructures and their maintenance.
- Financing mechanisms for transportation services and for customer services.
- Potential for PPP and other forms of private investment.

‘Go Large’ in Hamburg

Acknowledgements

- The 35 BHLS systems and their owners, who showed it could be done, and could be done extremely well
- More than 50 people in 14 European countries who took part in the COST TU0603 action, and shared info
- The COST program, who made this collaboration happen
  - big thanks to Thierry Gogier at COST program
- CERTU who led this action, especially Francois Rambaud
- The Final report authors and editors
  - Francois Rambaud, Odile Heddebaut, Arno Kerkhof, and me
  - Francois and Arno who generated the first half of this presentation
- The people who use all of the European BHLS systems every day and make them a success

European BHLS – Key Characteristics

City	System Identity	System Length (km)/ (Dedicated	Nature of Running Way	Passengers per day	Peak headway (Minutes)	Dedicated fleet?
Amsterdam	Zuid-Tangent	41 (33)	Bus-only road, bus lanes	40,000	6	Yes
Dublin	Quality Bus Corridor	12 (8.4)	Bus-lanes	34,000	< 1.5[4]	No
Gothenburg	TrunkBus	16.5 (7.5)	Bus-lanes	24,000	3.3	Yes
Hamburg	MetroBus	14.8 (4.0)	Bus-lanes	60,000	3.5	Yes
Helsinki	Jokeri Line	28 (6)	Bus-lanes (orbital route)	25,000	5	Yes
Madrid	Bus-VAO	16.1 (16.1)	Tidal segregated lanes	33,000[5]	< 1[4]	No
Nantes	BusWay	7 (6)	Bus-lanes	24,600	3.3	Yes
Paris	TVM	20 (19)	Bus-only road (suburban/orbital)	65,800	3.5	Yes
Prato	LAM	42 (15)	Bus-lanes	n/a	7	Yes
Stockholm	Blue Line	40 (12)	Bus-lanes	36,575[6]	5	Yes

European BHLS : Ridership gains

City	System Identity	BHLS Ridership Change[2]	Change in Operating Speed[4]	Peak-Period Headway Reduction	Network Restructuring in the corridor?	Major Tariff Restructuring as part of BHLS?	Unique Identity for BHLS services
Amsterdam	Zuid-Tangent	+47%	Significant	Yes	Significant	No	Yes
Dublin	Quality Bus Corridor	+125%	Major	Yes	Minor	No	No
Gothenburg	TrunkBus	+73%	Moderate	Yes	Significant	No	Yes
Hamburg	MetroBus	+20%	Minor	Yes	Minor	No	Yes
Helsinki	Jokeri Line	+100%	Significant	7 ⇨ 5	No	No	Yes
Madrid	Bus-VAO	+70-100%	+80-100%	Yes	Minor	No	No
Nantes	BusWay	+55%	Moderate	Yes	Significant	No	Yes
Paris	TVM	+134%.	Significant	5 ⇨ 3.5	Significant	No	Yes
Prato	LAM	+57%	+5%	15 ⇨ 7	Major	No	Yes
Stockholm	Blue Line	+27%	0	Yes	No	No	Yes