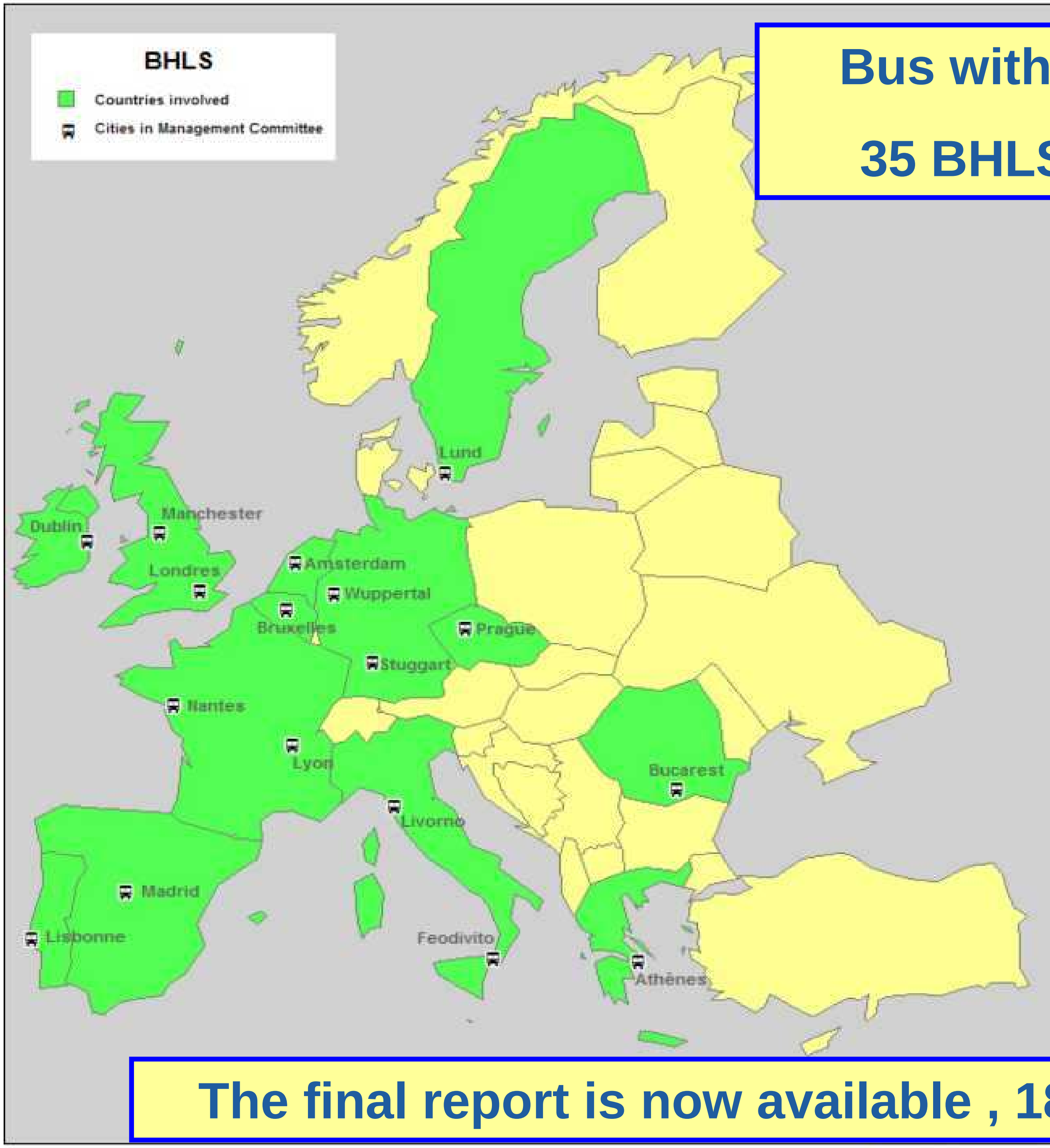



# Bus with High Level of Service

## 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**

# Bus with High Level of Service
# TU 603

Start date: 18/04/2007
End date: 21/10/2011

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

# Scope

- Introduction : the "system" approach …
- A wide spectrum of solutions
- Some remarkable 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)

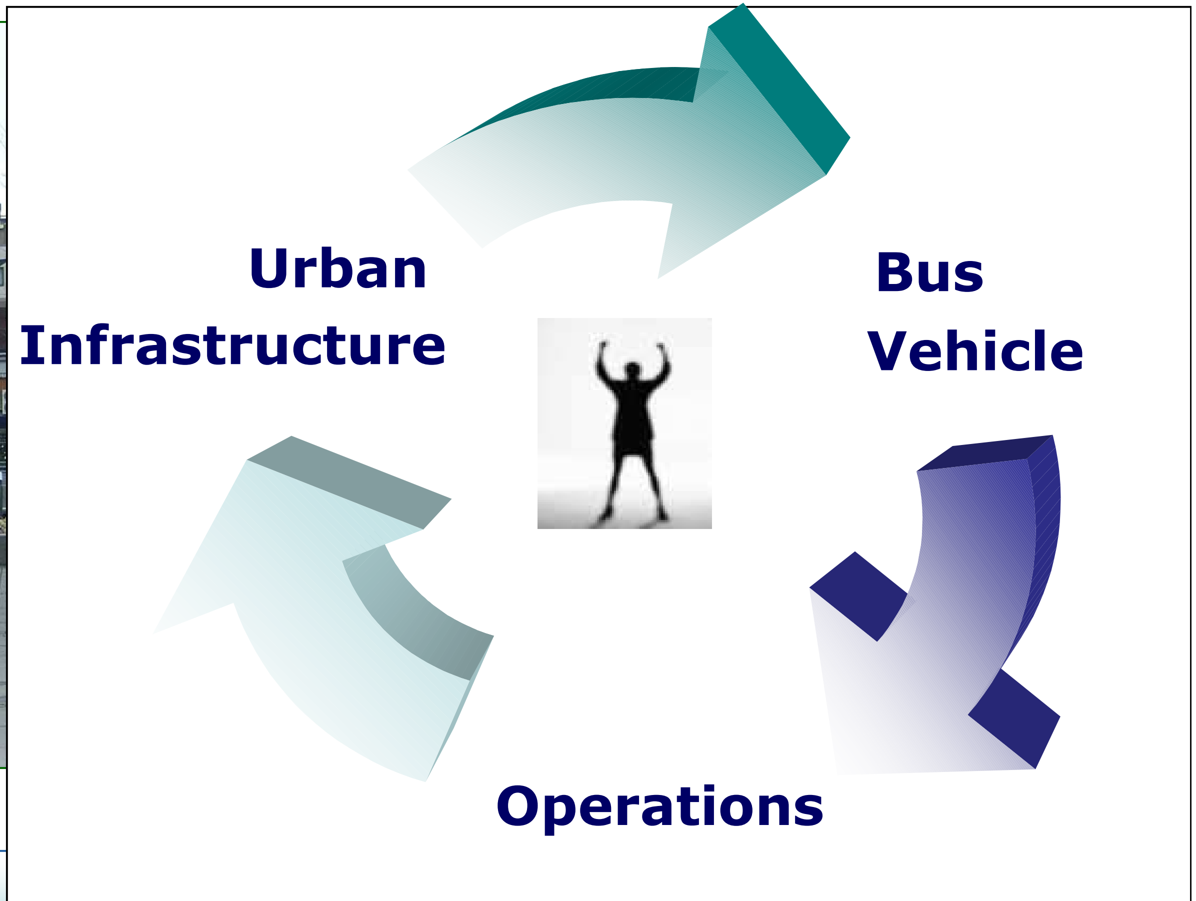


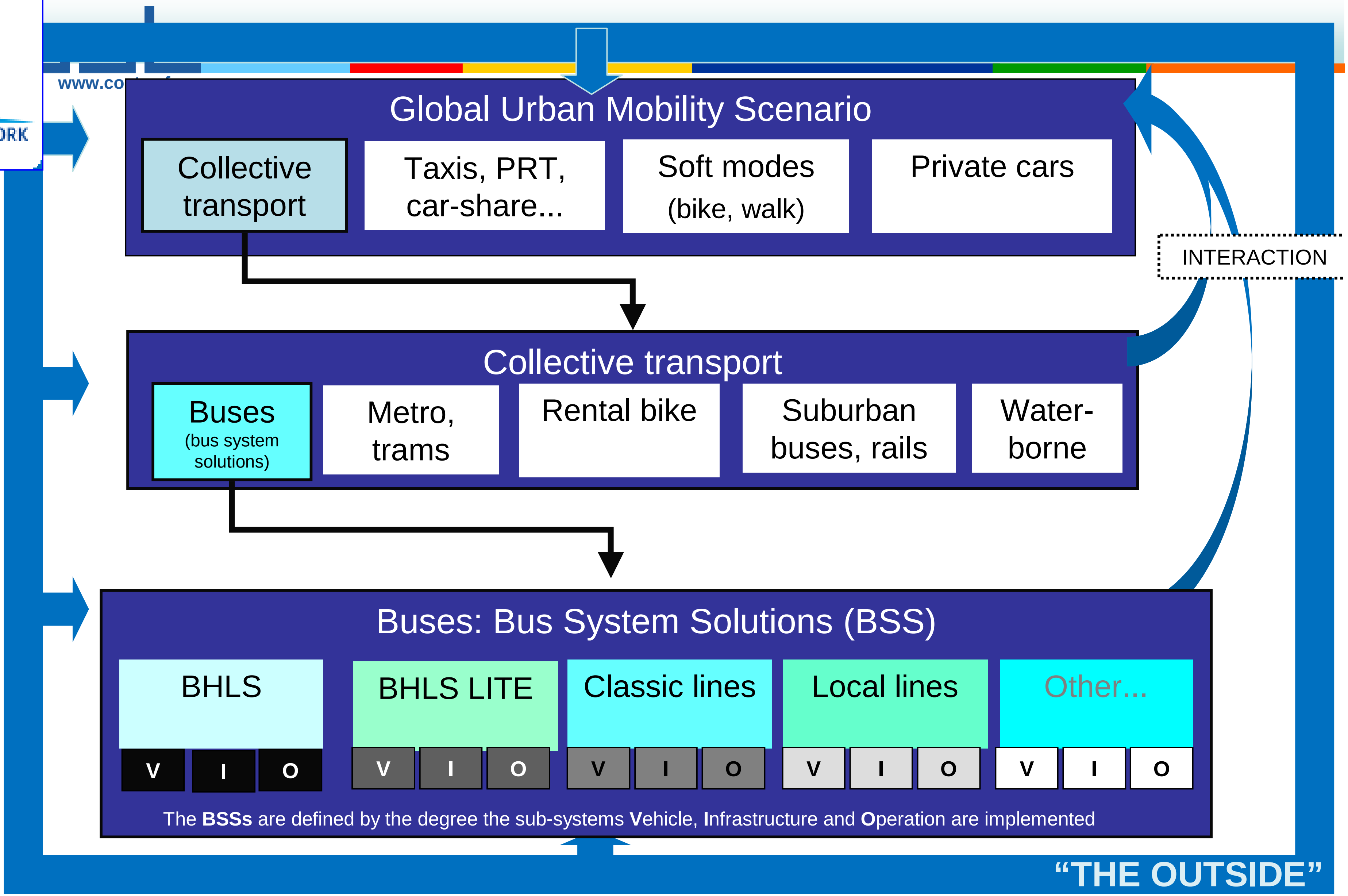
# BHLS : a « system » approach

**The whole is greater than the sum of its parts.**

**(Métaphysique) - Aristote**

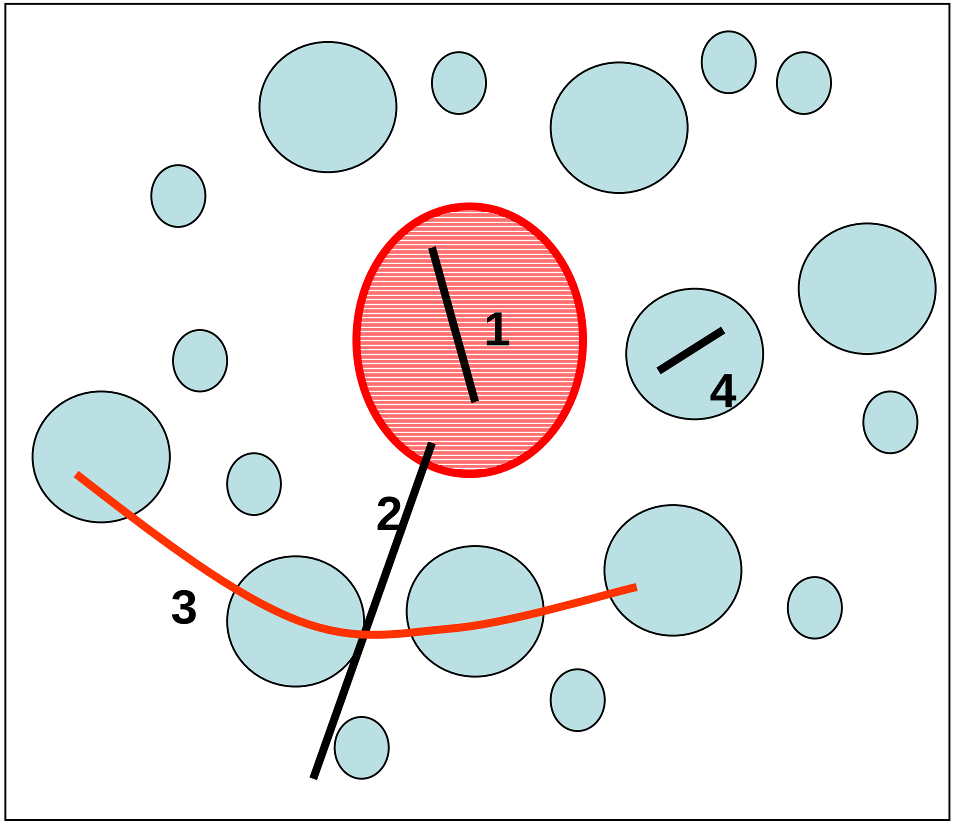

Jönköping (SE)

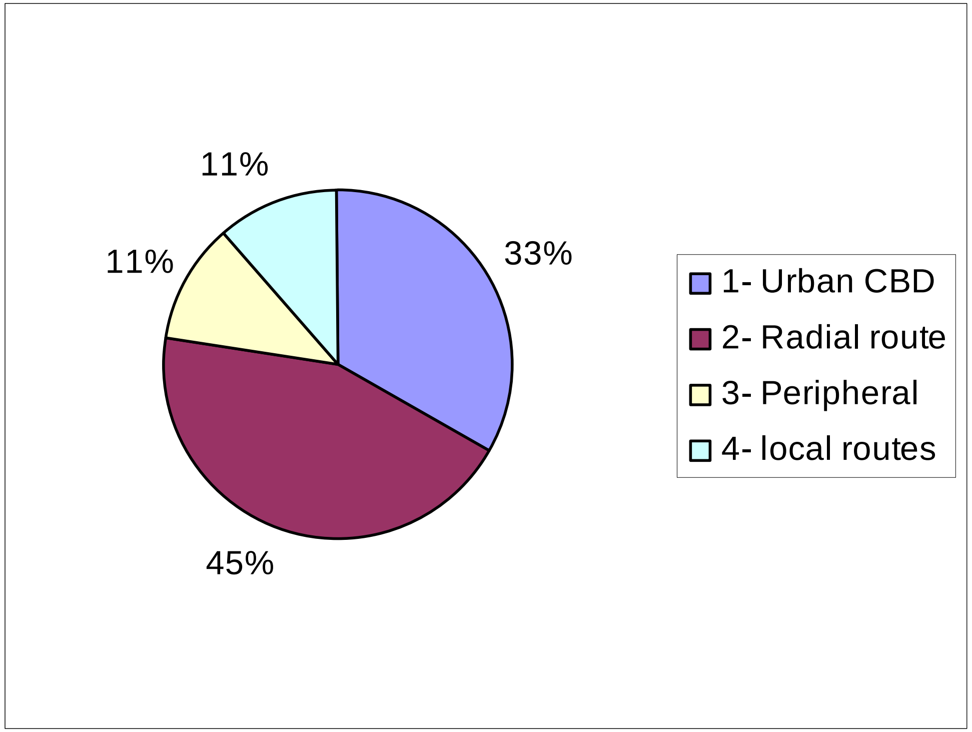





# EBSF Reference Architecture

# 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<br>- modal shift (from car, other lines) |
| | External impacts | - Mobility (constraints VP,…)<br>- Urbanism, economy, social<br>- Pollution / GES<br>- 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*

**.. An interest to have the same priority rule than a tram !**

Hambourg

Lorient

***Interesting implementation for safety reasons :***

- *Bottleneck one lane into the crossing*
- *A chicane to slow down the bus approaching a pedestrian zone*

Twente

Almere

Oberhausen

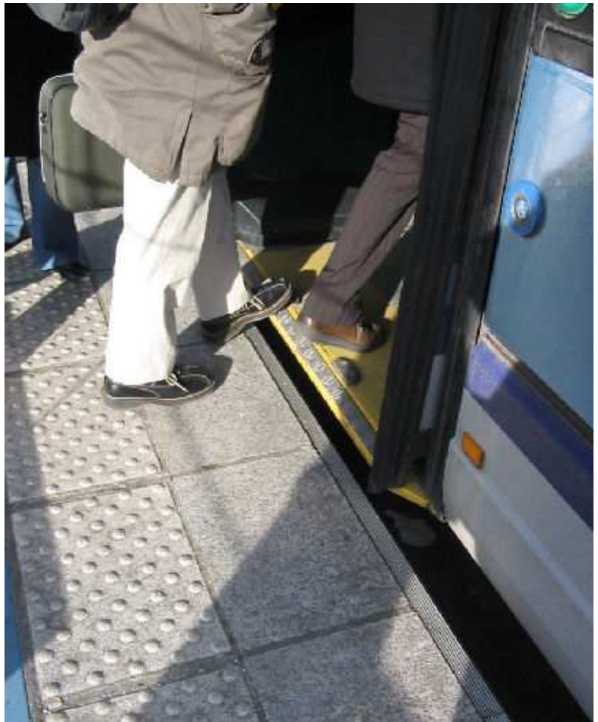
*Common lanes « tram and BHLS » :*

- *trade offs with accessible kerb hight*
- *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*

Twente

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


# *BHLS trends on motorways*

- **<u>Only few examples in Europe</u>**
  - Zuidtangent (Amsterdam); 5 km on emergency lane
  - Madrid : 16km in the middle of the motorway A-6
- **<u>An emerging market …</u>**




Zuidtangent


Madrid: 200 bus/h

# ITS tools for a high comfort and security...

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)

Cambridge


Fastract bus : plug and WIFI


CCTV


Fastrack

# Dynamic information, at all stations

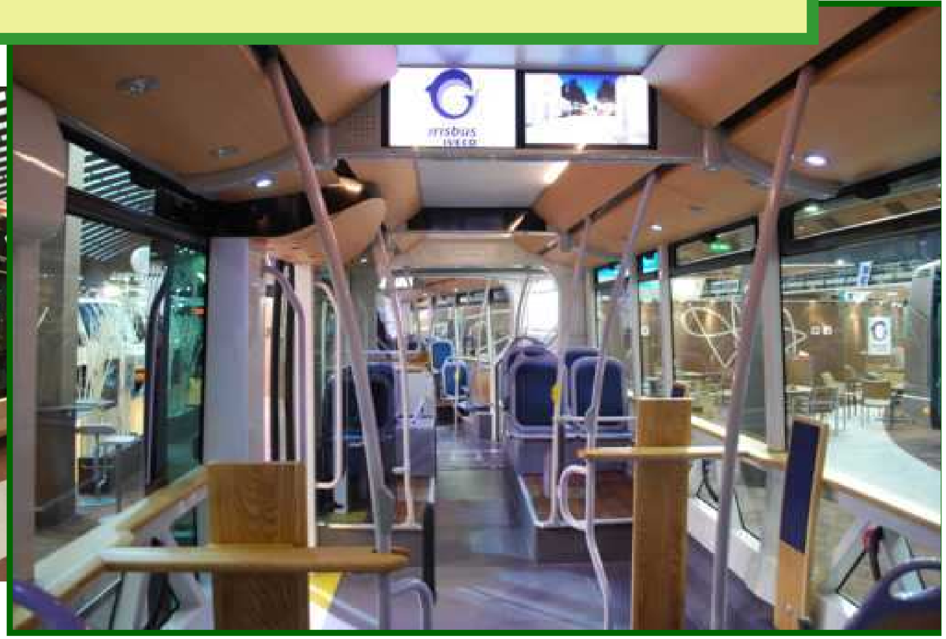




# A specific bus market for heavy BHLS schemes …

By Irisbus, the Crealis

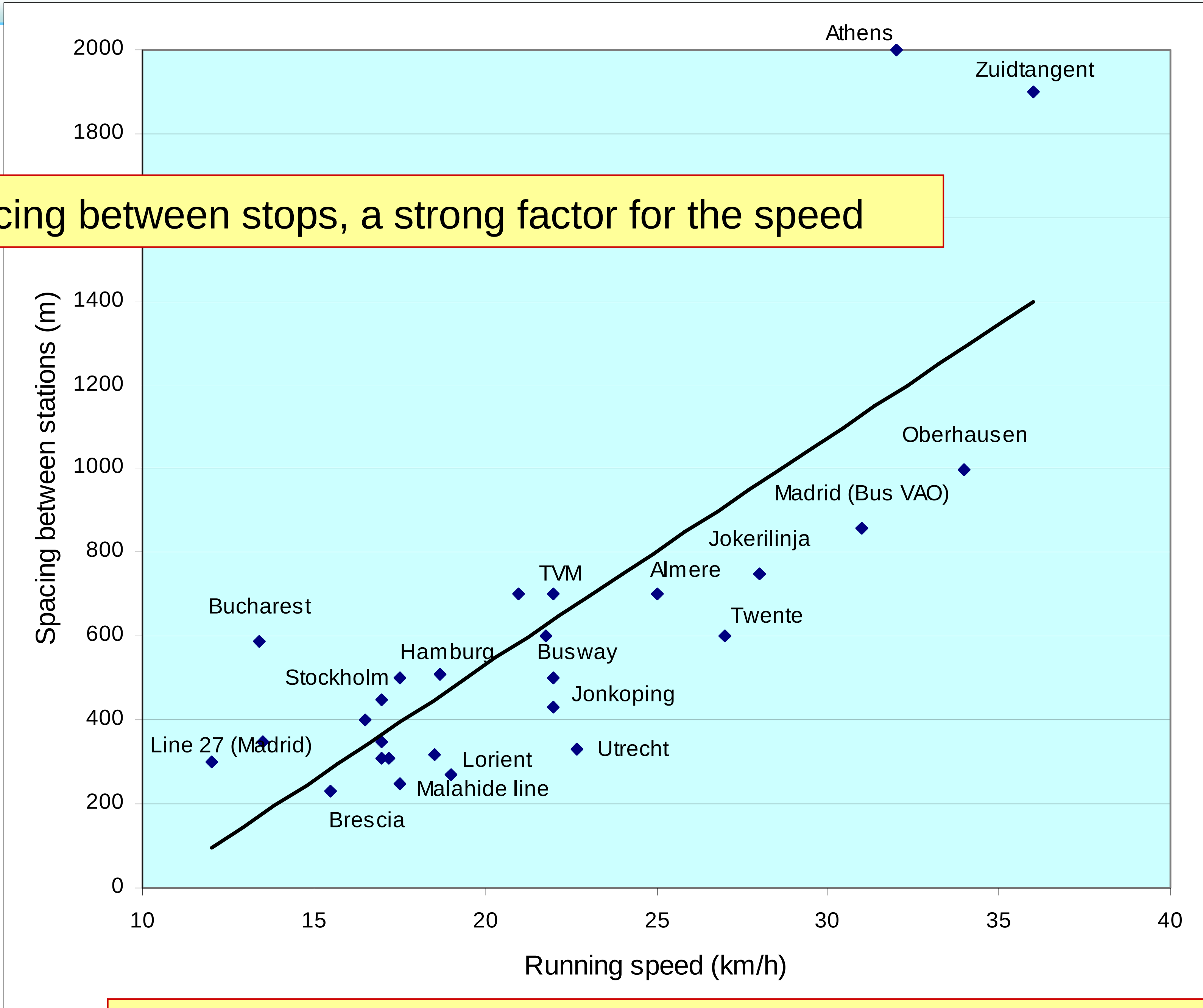
For the project of Nimes (2012)



By Wright

For Leeds and other cities

Spacing between stops, a strong factor for the speed

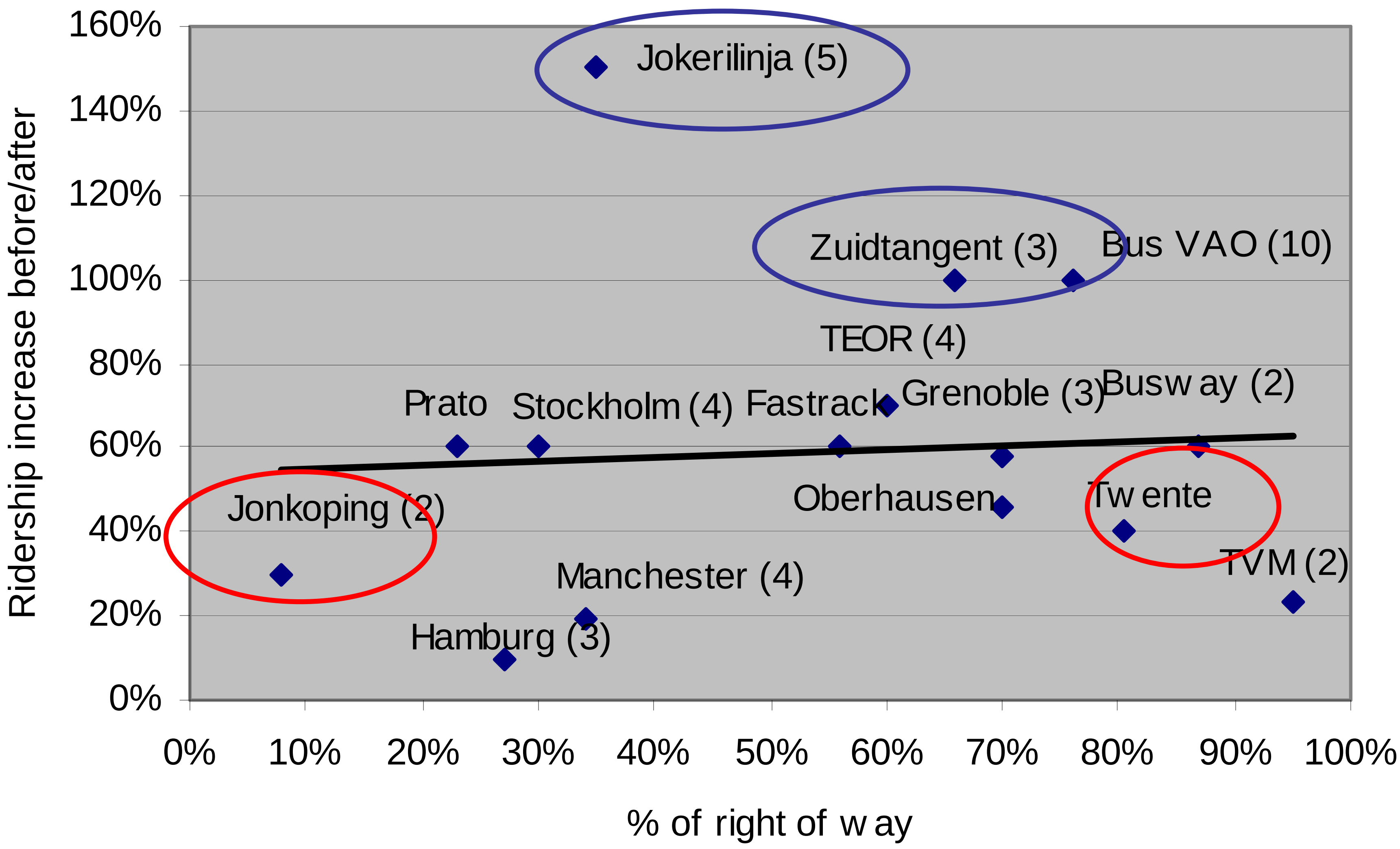



The strong economical factor : distance between stops

COST is supported by
the EU RTD Framework Programme
…vides the
COST Office through an EU 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 (Helsinky) | 12% | | |
| TVM (Paris) | 8,50% | | |
| 3 lines "Citybussarna" (Jönköping) | 6% | 5% | 13% new trips<br>1% from special T |
| Line 2 and 3 (Twente) | 6% | 24% | |
| Trunk network (Stockholm) | 5% | | 60% from metro |

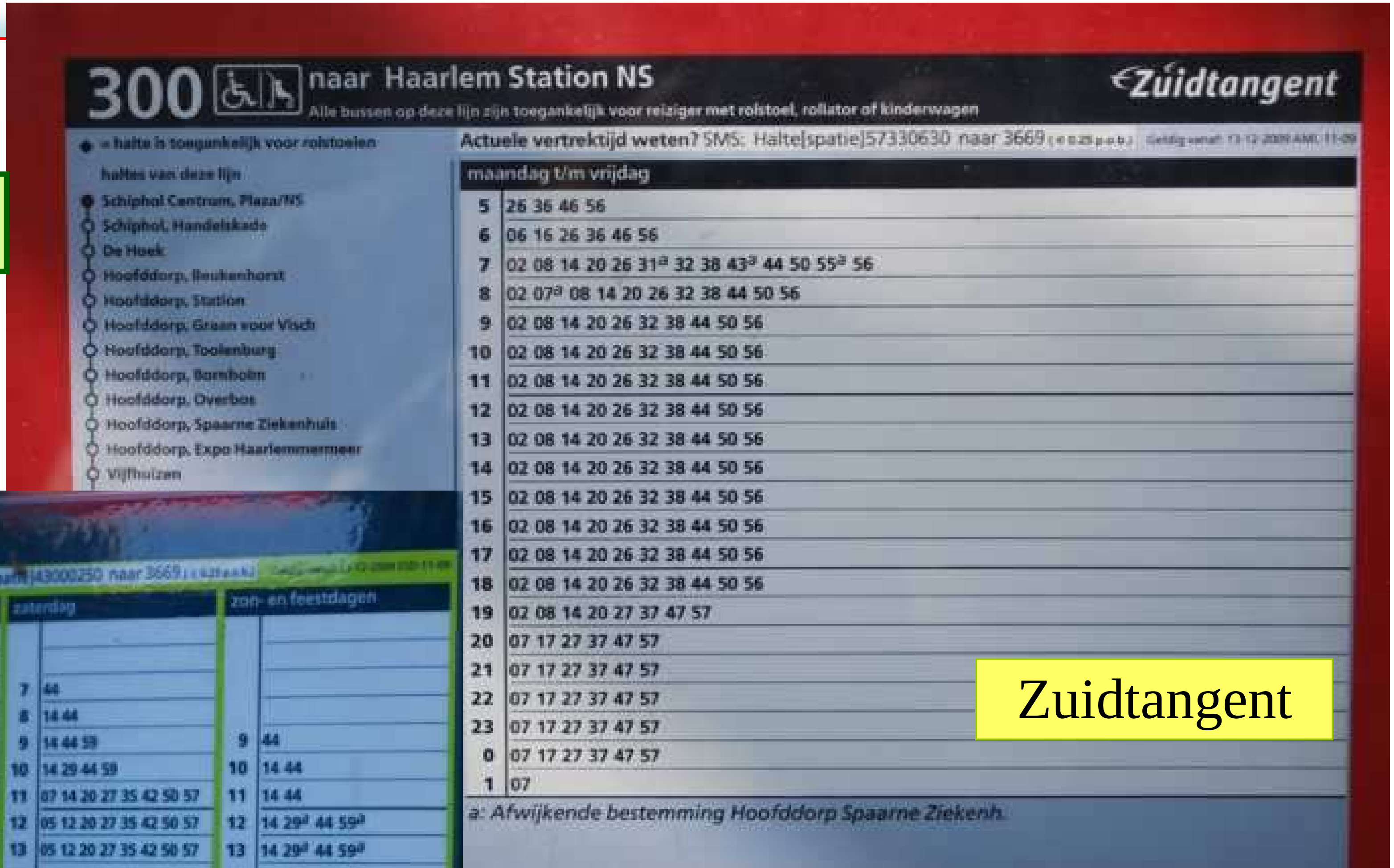
# Regularity / punctuality : some results achieved, according to the EU standard - EN 13 816

| | 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 |

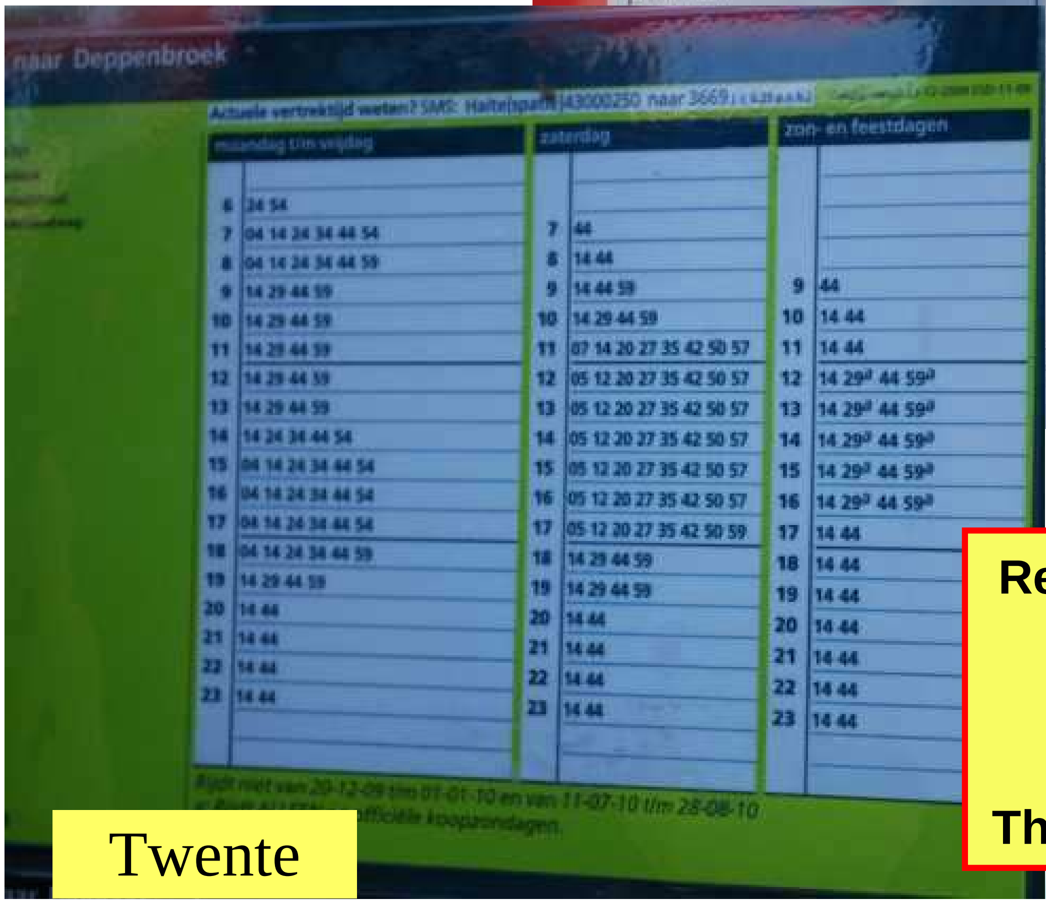
**Legend: where i=interval (regularity objective) and H = scheduled time (punctuality objective)**

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

# Clock timetable




Zuidtangent




Twente

**Regularity / punctuality : the most important indicator**

*********

**The speed is mostly an economical indicator**

# First recommendations …

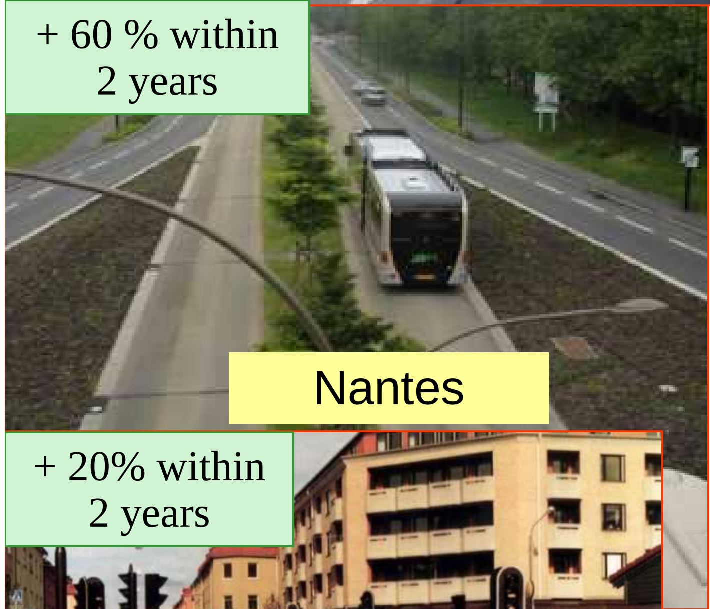
- A strong politician involvement for any BHLS project
- A long term vision at network level (Intermodality / hierarchisation)
- To give to BHLS buses the same “Tram” priority, with more visible signals
- A better enforcement governance (higher fines, …)

**<u>At last but not least:</u>**

- To keep operational our “BHLS” Knowledge Network …


# Thank you for your attention

**www.bhls.eu**



## Recommendations for a "full or complete" BHLS

## Questions? Discussion?

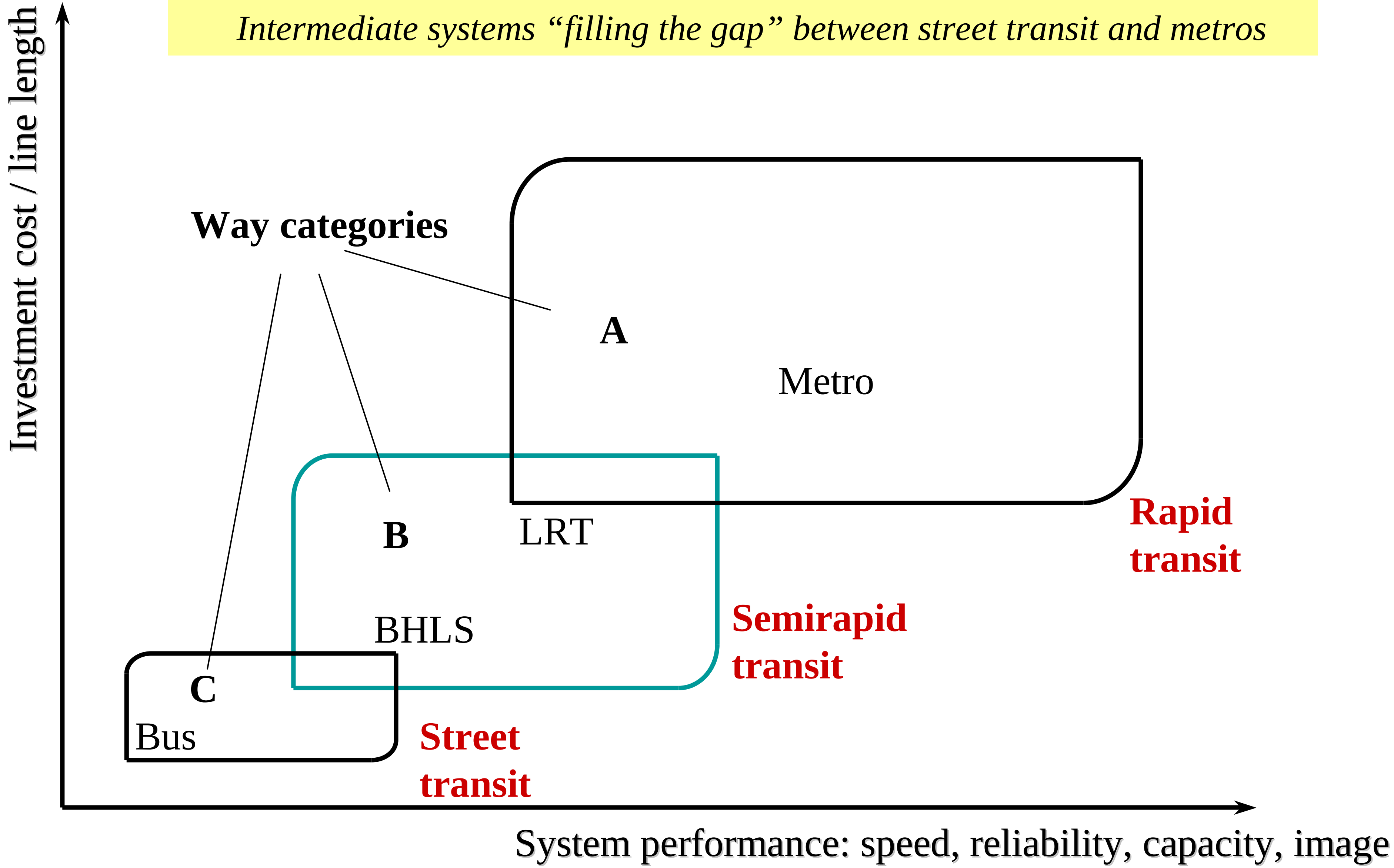
- **Belong to the structuring network** (same schedule span)
- **Right of Way B / A , when needed**
- **Strong intermodality (train, tramway, bus, biking…)**
- **Full IT-solutions : dynamic information at all stops,…**
- **High reliability** (up to 95%, 98% trips having a bus on time)
- **Mostly off 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

**Reference Vukan R. Vuchic – "Urban transit systems and Technology"**

*Intermediate systems "filling the gap" between street transit and metros*



**BRT trends : towards the most capacitive systems**

Curritiba – since 1974

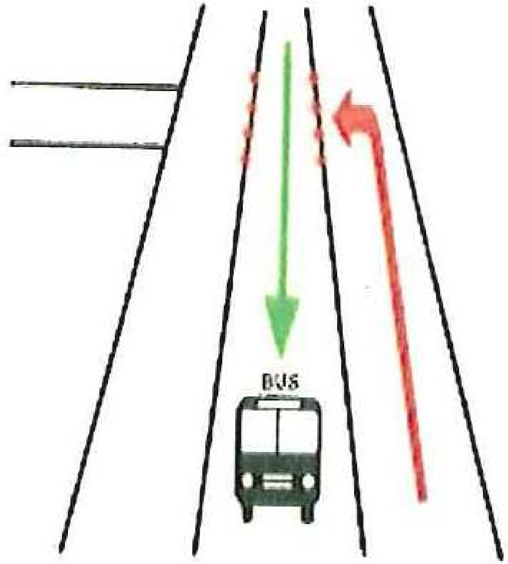
Ottawa – Since 1983


Transmilenio – Since 2000

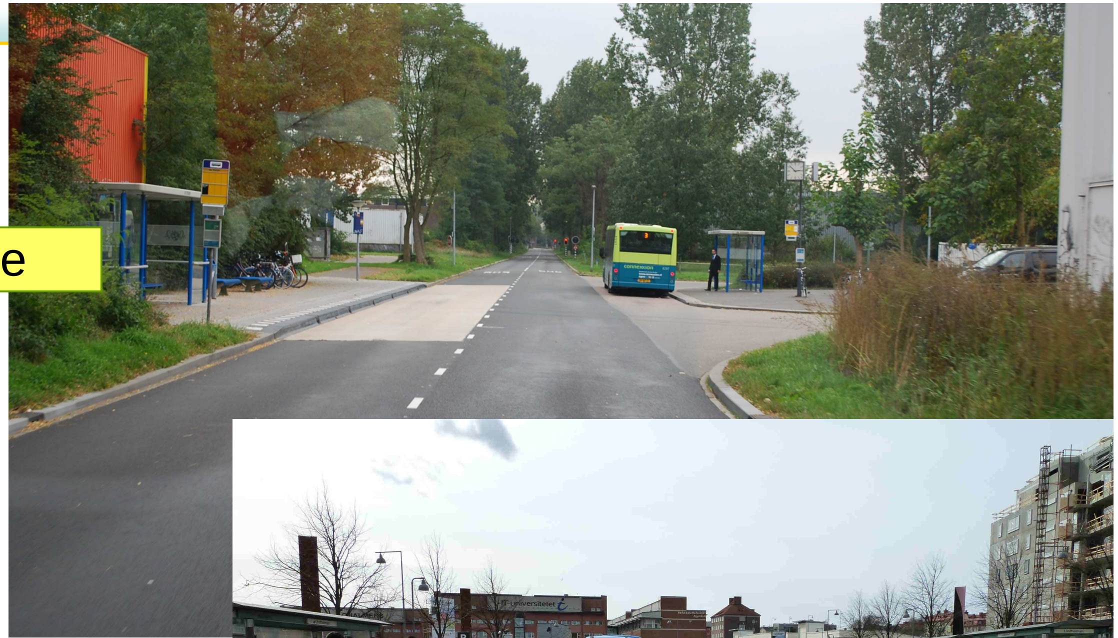

Guangzhou – Since 2010

*Innovative tool for Priority without traffic lights :*

*Twente : lights on ground for warning a bus approaching*




Almere



*Overtaking lane at some stations :*

- *to prioritise a BHLS*
- *for express services*
- *for a regulation stop*

Gothenburg

Zuidtangent