The European Bus System of the Future comes to cities across Europe

Umberto Guida
UITP, International Association for Public Transport

PERUGIA, 29th November 2012
POLIS ANNUAL CONFERENCE
EBSF General Information

- Large Scale Integrated Project
  - Directorate General for Research and Innovation

- The largest European Research project about Urban BUS
  - Budget Total/ EU Funding: 26 MEUR (16 MEUR)
  - 7th Framework Programme of the EU
  - 2008 - 2012
  - More than 400 experts contributed to the project

- Coordinator: UITP - International Association of Public Transport
  - UITP represents about 3,400 mobility actors from 92 countries worldwide
Why a project about Urban Buses?

- New Mobility Challenges
  - Congestion, pollution, energy efficiency, quality time...

- Urban Bus a solution to new mobility challenges
  - Highly efficient mode of public transport
    - Cheap, flexible in terms of capacity and speed.
    - Not require heavy infrastructure, is easy to put in service
  - The main carriers in Public Transport
    - 80% of all public transport passengers worldwide
    - In Europe, every year, 30 billion of passengers take urban buses - 60% of whole PT movement

- Nevertheless, bus is perceived as a less attractive mode of public transport

EBSF Objective: the Bus Renaissance!
Improve attractiveness and image of urban bus systems
“The whole is more than the sum of its part”

Aristotle, Metaphysics

EBSF – System Approach

Urban Infrastructure

Bus Vehicle

Mobility Operational Concepts
EBSF Logic - Key Areas of Innovation

Project Development Logic

User Needs
System Definition
Requirements
Solutions Design
Development of Technology or Concepts
Demonstrator
Use Case execution
Evaluation of Results

Life on Board
Dynamic Passenger Information
Energy Management
Bus Stop
Passenger Flow
Intermodality (Interchanges / Hubs)

Accessibility
Capacity
Driver Comfort

Energy Efficiency
Information Technology
Electrification of Urban Bus Systems
Modularity
Remote Diagnostic
IT Systems (AVMS) Interoperability
Efficiency of travel
Policy and rules for efficient Bus Services

Efficiency of travel
Bus Stop Dynamic Passenger Information Energy Management Bus Stop Passenger Flow Intermodality (Interchanges / Hubs)
EBSF
IT ARCHITECTURE
● Open and Service Oriented Architecture
● Based on Standard Internet technologies
  ○ IP interfaces and communication protocols
  ○ ensuring Interoperability
● Simple on-board installation rules
  ○ Vehicles equipped by manufacturers with basic IT network capabilities
● To build key and new Interoperable functions
  ○ Display Passenger Information (DPI)
  ○ Automatic Vehicle Monitoring (AVMS)
  ○ Remote Maintenance (RMS)
  ○ Multi-Application Driver Terminal

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**EBSF IT Specifications FREE**
www.ebsf.eu
Technical specifications of architecture & interfaces
Platform on-board installation requirements

**EBSF Test-bench**
Paris

**EBSF IT Standardisation**
European standardization in CENTC278
MADRID

Intermodality: importance of integrated and Real Time Information

We need harmonized and consistent data
Increased perception of

- travel quality and service (comfort, cleanliness, quality feeling) (+6%)
- availability of information (+20%)
- stops quality (+9%)
- waiting time (+8%)
- integration of bus services with other modes (+35%)

Increased general satisfaction with the service (+7%)

Specifications implemented on 2000 HOV Madrid commuter buses
GOTHENBURG
Accessibility and Driver training
Dwell time 5.75 min (-25%)
Average speed 25 Km/h. (+4%)
Capacity 139 passengers (+20%)
Required buses 12.1 (-18%)

Visual Guidance and dedicated training for better docking
Smart Driving system and tailored training
**Flexible internal layout** – 21 to 26 seats capacity

**Driver comfort**

**Telediagnostic on 50 CNG buses**

<table>
<thead>
<tr>
<th>Name KPI</th>
<th>Units/source</th>
<th>Variation (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical maintenance of the bus</td>
<td>Days between maintenance</td>
<td>+6%</td>
</tr>
<tr>
<td>Vehicle failure</td>
<td>Failures in a bus/km</td>
<td>- 15%</td>
</tr>
</tbody>
</table>
BUDAPEST
High volume passenger flow
## Areas of investigation

<table>
<thead>
<tr>
<th>Areas of investigation</th>
<th>KPI</th>
<th>Units</th>
<th>% variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service performance</td>
<td>Dwell time</td>
<td>sec</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>Commercial speed</td>
<td>Km/h</td>
<td>4%</td>
</tr>
<tr>
<td>Comfort, cleanness and quality feeling/ perception</td>
<td>Perceived comfort level on-board</td>
<td></td>
<td>7.7%</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Energy consumption</td>
<td>Litres*1000/pass-km</td>
<td>16.8%</td>
</tr>
<tr>
<td>Economic and operation issues</td>
<td>Operating costs</td>
<td>€/km</td>
<td>16.7%</td>
</tr>
<tr>
<td></td>
<td>Passenger capacity</td>
<td>Places-km</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

### Service comfort

**Telediagnostic**

- GSM
- GPS
- [Diagram of telediagnostic system diagram]
Bremerhaven
Attractive Bus Design

- Illuminated Door Frames
- GPS Amplifier and WLAN Router
- 230V Sockets
- Seat Occupancy System
- E-Services

Events, touristic information
EBSF Bremerhaven Bus Days
PT Real-Time multimodal Information
Infotainment
### Areas of investigation

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<th>KPI</th>
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<th>Variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance of the bus</td>
<td>Days between maintenance</td>
<td>+51%</td>
</tr>
<tr>
<td>Days in workshop</td>
<td>Days</td>
<td>-60%</td>
</tr>
<tr>
<td>Ratio of non-working vehicles</td>
<td>%</td>
<td>-25%</td>
</tr>
</tbody>
</table>

**BRUNOY**

Telediagnostic & Remote Maintenance

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**Service reliability**

**Anticipate interventions**

**Reduce time & costs of interventions**
ROUEN

A further step towards accessibility for all passengers
EBSF Bus-Stop – city side & bus side

A « concept bus-stop » testing modular services and solutions

Not just a waiting area but a urban space with services to passengers and citizens
EBSF Bus-Stop – information, communication & services for transport

Integrated panels, fixed information, screens for dynamic info, interactive systems

Digital information elements as expensive as the structure

Electric bikes
ticket machines
EBSF Bus-stop services: Mini-kiosque and bibliotheque self-service

Agreement with vendors and associations

Attract new players
Enable new business cases
EBSF Bus-Stop: multiservice

Wi-fi, recharging plugs, defibrillateur, heating glass, ambient sound & lights, JCDecaux totem

Highly appreciated by citizens / users

Higher maintenance costs but... allow new business cases

Modular solutions and services
The European Bus System of the Future comes to cities across Europe

- Transferability of EBSF solutions across Europe
  - CIVITAS methodology
  - Exercise on-going
  - Umbria Mobilita’

- Web-tools for supporting transferability
  - Developed Solution
  - Bus System functional specifications
Accessibility simulator

Bus-stop prototype in Paris

Combined simulation for passenger, bus and bus-stop interaction

Accessibility and passenger flow solutions
New internal layout, new folding seats and door dimension

Test in Goteborg
5 Main European Bus manufacturers joint resources for pre-competitive research

Efficient and open platform for dialogue between urban bus transport stakeholders

The reference for Bus System research in Europe

- Definition of EBSF System
- Development and test of innovation on vehicle
  - accessibility, driver workplace, modularity, energy management
- Development of innovation on infrastructure and operational concepts
  - Interchanges, bus station
- 7 EU Use Cases
- Vision and Recommendations
- IT Standard architecture development and test

Further research on Bus Systems

Bus Systems Roadmap

Areas and priorities for research on Bus Systems

First release developed in collaboration with ERTRAC

Bus Systems Exploitation / Innovation Platform

From research to Innovation

Bus Systems innovation strategy

Bus Systems “quality label”

Consolidation of solutions

EBSF IT Platform

Driver’s workplace

Apply solutions, concepts, approach

Exploitation of the Bus System Innovations
EBSF Project

Bus Systems Roadmap
- Bus Integration in new urban scenarios
- IT platform integration / standard adoption
- Sustainable bus system
  - Energy efficiency
  - Environmental performances
  - Electrification of bus systems
  - Innovative vehicle technologies
  - Modularity
  - Mobility challenges of an ageing society

Further research on Bus Systems
- Capitalise on successful projects about Bus Systems (EBSF, COST-BRT..)
- Coordinate research
- BS Roadmap and funding frame
- Exchanges of knowledge about bus systems with international experts
- Disseminate BS research results
- Support deployment and implementation of BS innovations
- Exploitation/Innovation Platform
  - Topics: accessibility, special events, intermodality, level of service, modularity, energy, IT

Exploitation of the Bus System Innovations
- Interchanges (NODES)
- IT Platform (EUROPTIMA)
- Electrification of Bus Systems

Bus Systems Exploitation / Innovation Platform
- From research to Innovation
- BS innovation strategy
- BS “quality label”
- Consolidation of solutions
  - EBSF IT Platform
  - EBSF Driver’s workplace
- Apply solutions, concepts, approach
Thank you for your attention

More information at

http://www.ebsf.eu/

or contact

Umberto Guida  umberto.guida@uitp.org
Pauline Bruge  pauline.bruge@uitp.org

at UITP