Retrofit boarding assistance device for old IC-coaches

Dr. Bernhard RÜGER
Vienna University of Technology, Research Center for Railway Engineering
accessibility

- Is a today’s must for train and infrastructure operators

- Link between the platform and vehicle is an essential part regarding accessibility within the mobility chain.
EU-project: Public Transportation – accessibility for all

• Project **founded** by EU with **FP7**

• **Goal:** Find a solution for improving the boarding situation
  – System integration into **existing coaches**
  – System shall be **standardized** for most existing coaches
  – System shall be used by **ALL mobility reduced** passengers

• **Consortium:**
  – **Coordinator:** Rodlauer Accessibility Consulting
  – **Universities** (Vienna University of Technology, University of Belgrade)
  – **Manufacturers** (MBB-Palfinger, Siemens Austria, Bombardier Transportation)
  – **Operators** (SBB, ÖBB, MAV, SZ, BDZ, NRIC, VBK)
Decission making process

• Who are the relevant passengers?
  – Who actually needs assistance?
  – Which kind of assistance is required?

• For which boarding situations assistance is required?
  – For which transportation systems?
  – For which vehicles?
Relevant passengers – people with reduced mobility

• Wheelchair user
Relevant passengers – people with reduced mobility

• Wheel chair user
• Walking disabled
Relevant passengers – people with reduced mobility

• Wheel chair user
• Walking disabled
• Visually impaired / blind user
Relevant passengers – people with reduced mobility

- Wheel chair user
- Walking disabled
- Visually impaired / blind user
- Hearing impaired / deaf persons
Relevant passengers – people with reduced mobility

- Wheel chair user
- Walking disabled
- Visually impaired
- Hearing impaired
- Elderly persons
Relevant passengers – people with reduced mobility

- Wheel chair user
- Walking disabled
- Visually impaired
- Hearing impaired
- Elderly persons
- Persons with baby prams
Relevant passengers – people with reduced mobility

• Wheel chair user
• Walking disabled
• Visually impaired
• Hearing impaired
• Elderly persons
• Persons with baby prams
• Passengers with luggage
Relevant passengers – people with reduced mobility

• Wheel chair user
• Walking disabled
• Visually impaired / blind user
• Hearing impaired / deaf persons
• Elderly persons
• Persons with baby prams
• Passengers with luggage
• And others
Relevant passengers – people with reduced mobility

- Wheel chair user
- Walking disabled
- Visually impaired / blind user
- Hearing impaired / deaf persons
- Elderly persons
- Persons with baby prams
- Passengers with luggage
- And others
Public Transportation - Accessibility for All

Combination

- acce height
- baby carriages
- luggage
- size (children)
- age/handicaps

Combination
Coming back to the decision making process ....

- Who are the **relevant passengers**?
  - Who actually needs assistance?
  - Which kind of assistance is required?
Relevance for technical boarding assistance devices

<table>
<thead>
<tr>
<th>User with devices</th>
<th>wheelchair, walking frame</th>
<th>1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical impaired</td>
<td>Walking disabled, with crutch or sticks, elderly, diminutive people</td>
<td>2</td>
</tr>
<tr>
<td>User with special needs</td>
<td>Visual and hearing impaired</td>
<td>2-3</td>
</tr>
<tr>
<td>General passengers</td>
<td>Passengers with luggage, children, pregnant, baby prams</td>
<td>2-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very important – critical to successful operation (“must have”)</td>
</tr>
<tr>
<td>2</td>
<td>Important – high benefit for users and operators (“nice to have”)</td>
</tr>
<tr>
<td>3</td>
<td>Less important – some benefit for users and operators, but not absolutely necessary</td>
</tr>
</tbody>
</table>
Coming back to the decision making process ….

• For which **boarding situations** assistance is required?
  – For which transportation systems?
  – For which vehicles?
Analyses of existing systems

• Urban transportation
  – Tramways
  – Busses
  – Underground

• Local transportation

• Inter City (long distance) transportation
Urban transportation / local transportation

• „Closed systems“
  – Existing low floor systems with level boarding
  – High floor vehicles → operators plan changing to low floor soon

• Urban transportation offers **level boarding** (or soon will do)

• Local traffic → similar situation
Level boarding – existing technical devices

- gap bridging
  - moveable step
  - hinged step
  - bumper strip
  - manuel ramp
One step – existing technical devices

• ramps
two steps or more – existing technical devices

• Platform based lifts
two steps or more – existing technical devices

• Vehicle based lifts
  – Entrance doors wider than 90 cm
  – or entrance door not at the end of the vehicle
Requirements and needs of the operators

- Easy and quick handling (time need!)
- Reliability
  - System must work when it is needed
- **Costs** (implementation, operation and maintenance)
- **Majority** of operator prefers **vehicle based** systems
  - Independent from the infrastructure
Decission making process ....

• For which **boarding situations** assistance is required?
  – For which transportation systems?
  – For which vehicles?

**Remaining system** (no solution till now):

→ **Vehicle based** solution for **UIC coaches**
  → Door width 80cm
  → Doors at the end of the vehicle
Decission making process ....

Which system?

• Ramp?
  – Not possible because of height difference

• Lift
  – Liftsystem can usually be used only for wheel chairs
Decision making process...

All vehicles

existing solutions?

local, urban, suburban transportation

high floor vehicles (high speed and long distance trains)

existing solutions?

Door width >90cm

Door width 80cm (UIC-coaches)

operators’ wish?

platform based system?

vehicle based system?

technical limitations?

ramp?

lift?

vehicle based lift for UIC wagons!

no new development necessary

new development is necessary
Decission making process …. 

Accessibility for all passengers?

• for all other passengers **special service for everyone** who needs and **wishes assistance** is recommended

• Example: Atendo (RENFE)
UIC-coaches – challenge / Coupling devices

Classic trains

Multiple units
Classic coach – stairway / space limitation
Stairway space
Large height difference and horizontal gap
Idea: Ramp ?
Idea: Step-lift
Idea: Extractable lift
Idea: Linear lift?
Idea: Twin pillar linear lift?
Selected solution: Swivel lift
PubTrans4All – final prototype design concept – test mock up

- The concept of a swivel lift is not totally new
- But for classical UIC-wagon many adaptations were necessary
PubTrans4All – final prototype design concept

- The concept of a swivel lift is not totally new
- But for classical UIC-wagon many adaptations were necessary
Space for stowed lift
Replacement of the mechanical connection between door mechanism and foldable step with pneumatic drive
Widening of the passage clearance in side corridor
Restricted space in the entrance area

Some interventions on the wagon before lift installation are needed (Example-BDŽ coach)
Interventions in entrance area (BDŽ coach)

- Occupied: door automatic, end ligths, electro equipment...
- Handrail (can be integrated in BAS solution)
- Potential place for stowed BAS
- Window
- Door open
- Handrail (can be integrated in BAS solution)
- Potential place for stowed BAS
- WC
PubTrans4All

After laboratory testing the prototype has been incorporated in a UIC-wagon of the Bulgarian State Railways and tested on the railway network in Bulgaria.

The prototype of a BAS incorporated into the UIC-wagon has been displayed on the InnoTrans from 18th to 21st September 2012 in Berlin.
Thank you for your attention!

www.pubtrans4all.eu