Using ITS technology to enable a safer way to school for children

Final results of the European project SAFEWAY2SCHOOL

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Agenda

1. Project Background and Aim
2. The SW2S System Architecture and Devices
3. System Evaluation
4. Conclusion
School transport in Europe

- Europe → millions of children travel to and from school every day (TIS, 2004).

- Mixed system
  - Right to school transport.
  - Regulations/Financing.
  - Purchased/Public transportation.
  - Vehicles used for transportation (bus, taxi, boat, train….).
Different ‘Bus Stops’ in Europe

Austria

Sweden

Germany

Italy
SAFEWAY2SCHOOL - AIM

• Combine a wide range of technologies on localization, route planning, route guidance, vehicle to infrastructure and on-board systems and sensors, short-range and GPRS communications, etc; in order to solve holistically the issue of safe transportation of children from their door to the school and vice-versa.
SAFEWAY2SCHOOL

- 3 year (2009-01-09 to 2012-08-31)
- 291 Person Months
- Total budget: 3 668 737 Euro
- From EC: 2 849 248 Euro

- 42 deliverables (17 are public)
- Web page: www.safeway2school.eu
Consortium

Swedish Road and Transport Research Institute, Linköping (Coordinator), Sweden

Center for Research & Technology Hellas/ Hellenic Institute of Transport, Greece

National Institute for Transport and Safety Research, France

Amparo Solutions, Sweden

Fleetech ab, Sweden

Vagverket, Sweden

Kuratorium für Verkehrssicherheit, Austria

University of Modena and Reggio Emilia, Italy

University of Stuttgart, Germany

Mizar Automazione S.p.A, Italy

Motor Transport Institute, Poland

International Institute for Information Design, Austria

Linkopings Universitet, Sweden

Maelardalens hoegskola, Sweden

ITS: Real Solutions for Real Needs
System architecture and specification

- Children
  - Mobile phones
    - VRU transmitters
      - Wireless communication by radio
  - Traffic training for children and school bus drivers

- Road users
  - "Intelligent" bus sign
  - "Intelligent" bus stop

- School buses
  - Bus unit (BU)
    - Mobile communication (GPRS)
  - Driver Support System
    - Mobile communication (GPRS)

- Municipality Office
  - Office computer
  - Safety criteria
  - Infrastructure database

- Traffic Control Centre

- Parents
  - Home computer (e-mail/website)
  - Mobile phone

ITS: Real Solutions for Real Needs
On-Board Unit OBU and RFID system

- OBU: Display
- RFID card reader
DSS Driver Support System

- On-board unit with display:
  - next stop (name and distance)
  - scheduled arrival time
  - communication with control centre

Red bus = delay  
Green bus = on time  
Blue bus = early  
Delay in mins

Buttons to contact Control Centre or send messages
OBU and DSS – Functions

- The route to the next stop.
- The distance to the next stop.
- A list of who are expected to board.
- Details about the passengers.
- Seat belt indicator for the passengers.
- Generation of late arrival warning message.
- Recording of the ID of children boarding.
- Generation of message if a child is missing.
- Generation of reports regarding each trip.
- Warning sound generation.
VRU unit

- Communicates with an Intelligent Bus Stop, IBS and the OBU via a Bus Unit
- VRU unit in the vicinity of an IBS activates the flashing lights and warns passing vehicles of the presence of children

[Image of VRU unit with labels: CE mark, reflective foil, hanger for easy attachment, serial number, durable plastic]
IBS – Intelligent Bus Stop

- Communicates wirelessly with the VRU units.
- VRU units in the vicinity makes the IBS start flashing yellow warning lights and warn passing vehicles.
School Bus Sign

- On-bus warning sign: an active Variable-message sign or an SW2S warning sign mounted on the bus.
System Evaluation
Evaluation tools for pilot sites

• Direct observations.
  – Speed measurements.
  – Eye tracking.

• Events diaries.
  – Waiting at the bus stop.
  – Observation of children's safety behaviour.

• User surveys.
  – Acceptance and Usability for children, parents, bus drivers and transport operators.
  – Quality of Service for bus drivers.
  – Use interface for children and adults.
  – Usability of training kit.
Acceptance Scale – SW2S system

<table>
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<tr>
<th>Acceptance</th>
<th>OVERALL</th>
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</thead>
<tbody>
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<td>Usefulness Scale</td>
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</tr>
<tr>
<td>Satisfying Scale</td>
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</tbody>
</table>

Usefullness

Satisfaction
Impact on safety & security
Overall Usability Index

79.2%
Conclusion

• A wide range of devices and services were developed.
• System evaluation showed high usability and an increase of safety.
• Differences in the state of the school transportation service today, different conditions and regulations for purchased and public transport complicate the situation and therefore need extra attention.
Thank you for attention!

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