A survey on VMS concerning UNECE WP.1 members

Trans European Motorways (TEM) Project
UNECE/Transport Division

Antonio Lucas-Alba
University of Zaragoza, Spain
Background: the EasyWay program

- 2003-2012 ITS implementation program (European Commission)
- VMS harmonization: from 3 to 14 countries. Four main tasks:
  1. Putting together, editing and publishing the specific way countries sign when using VMS. So we know what the others do...
  2. Developing empirical studies to test new pictograms and signing structures, then deciding upon data.
  3. Preparing Deployment Guidelines and distributing them among partners, with the compromise “criticize it, improve it, then use it”.
  4. Bringing the most valuable contents (pictograms, signing structures) and rules to WP.1 UNECE. Nearly all partners in Europe have ratified the Convention and this is an strategic issue. Dutch, English, French, German, Italian, Spanish, Swedish, and Czech public officers worked on the documents we bring here. Spain assists to WP.1 UNECE as part of the European compromise.
Background: the Trans European Motorway Project

- Questionnaire concerning:
  - Common VMS elements
  - Elements that can endanger road safety
- Initial focus: state of the art concerning VMS use by UNECE WP.1 Member States
Contents

- Communication: verbal, visual
- Road signs: simple and complex
- The recent past
- The task
- Way forward
Communication: verbal, visual

- Languages are meant for communicating
- Languages convey meaning in differing ways
- Verbal languages:
  - **Semantics**: meaning comes from words (*morphemes*)
  - **Syntax**: meaning comes from the way words are ordered with each other (*order within the sentence*)
  - **Pragmatics**: sentences makes sense within a given place and moment (*context*)
## Communication: verbal, visual

<table>
<thead>
<tr>
<th>VERBAL LANGUAGES (English)</th>
<th>VISUAL LANGUAGES (Road Signs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Words, morphemes</td>
<td>• Pictograms, alphanumeric</td>
</tr>
<tr>
<td></td>
<td>signs, shapes, colors</td>
</tr>
<tr>
<td>• Short sentences</td>
<td>• Variable message signs, road</td>
</tr>
<tr>
<td></td>
<td>panels</td>
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<tr>
<td>• Conversation (context)</td>
<td>• Driver reads road signs</td>
</tr>
</tbody>
</table>

WP.1 66th Session. Geneva, September 25th 2013
Communication: verbal, visual

VERBAL LANGUAGES (English)

- “Dangerous congestion” (adjective + noun)

VISUAL LANGUAGES (Road Signs)

- “Road works (located) on the way to Aalborg”

94.4%

80.8%
Road signs: simple and complex

Simple road signs
(words, noun phrase)

- PICTOGRAMS
- 1995 (official)

Complex road signs
(short sentences)

- ROAD PANNELS
- VARIABLE MESSAGE SIGNS
- 2011 (in progress)
Complex road signs: posted and variable

The model

VMS (topological location)

Direction
Location

Direction
Location

Variable event
### Issues on VMS design: combining informative elements – *from A to B*

<table>
<thead>
<tr>
<th>Comprehension Test 2006-2007 (7 countries)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>65.1% (N=678)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Comprehension Test 2010 (9 countries)</th>
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<tbody>
<tr>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>48.9% (N=1175)</td>
</tr>
</tbody>
</table>

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<tr>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>56.3% (N=1676)</td>
</tr>
</tbody>
</table>

| ![Image](image13.png) | ![Image](image14.png) |
|------------------------|
| 45.6% (N=1722) | 24.6% (N=1260) |
Issues on VMS design: combining informative elements – *up to B*

<table>
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<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
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<tr>
<td>56.5% (N=1591)</td>
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<tr>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>37.4% (N=1238)</td>
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</tbody>
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<tbody>
<tr>
<td><img src="image9.png" alt="Image" /></td>
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<tr>
<td>68.9% (N=1702)</td>
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Issues on VMS design: combining informative elements – *on/after A*

<table>
<thead>
<tr>
<th>Comprehension Test 2006-2007 (7 countries)</th>
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<tbody>
<tr>
<td><img src="image" alt="Sign" /></td>
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<tr>
<td>20.4% (N=705)</td>
</tr>
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</table>

<table>
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<tbody>
<tr>
<td><img src="image" alt="Sign" /></td>
</tr>
<tr>
<td>40.2% (N=1232)</td>
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</tbody>
</table>

<table>
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<tr>
<td><img src="image" alt="Sign" /></td>
</tr>
<tr>
<td>6.2% (N=1620)</td>
</tr>
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</table>

*Note: The symbols represent different types of VMS signs used in the tests.*
What you read first, comes first

The location at the bottom comes first

“left is left and right is right”
Complex road signs: spatial syntax for iconic communication

Event up to A  Event from A to B  Event on/after A

LONDON  EDGWARE  LONDON
ROAD SIGNS ARE CONTENT ELEMENTS AND DISPLAY POSSIBILITIES

- PICTOGRAMS (SYMBOLS)
- ABSTRACT ALPHANUMERIC
- NUMBERS
- TEXT INSCRIPTIONS
- KEEPING AN INTEGRATED, “READABLE” ORDER BETWEEN THEM

- PAINT COAT
- FULL MATRIX LED
- COMBINED HIGH (symbol) AND LOW RESOLUTION (text, inscriptions) LED
- LOW RESOLUTION LED (text only)
Complex road signs and iconic communication: lost in the middle 1980s – the mixed picto-words road sign

Background: the questionnaire

1. Referent signing catalogues in use
   1. The general context for VMS use
   2. Particular VMS configurations per country
2. Main signing functions operated through VMS
3. Specific road/traffic situations managed through VMS
Background: the questionnaire

1. 20 respondents out of 17 countries. Finally 19 respondents from 15 countries.
2. Belgium, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Luxembourg, Norway, Portugal, Romania, Slovenia, Spain, Sweden, and The Netherlands
3. Mainly official bodies
4. Reliable respondents with middle-high profile
Main results

1. Practically all countries ratified the 1968 Convention
2. Practically all use VMS
3. Most follow EN 12966 standard
4. Interurban use of VMS more habitual than urban
5. Most operate middle sized VMS networks (100-500 VMS)
6. National administrations rule VMS
7. Public (including city councils) and private partners operate VMS
Main results

1. VMS displaying at least one pictogram in own country: difficult to know (63.3%)
2. VMS displaying at least one pictogram in own organization: 73.1%
   1. Pictogram-only: 30.5% (9 countries)
   2. Text-only: 25.9% (13 countries)
   3. Pictogram-text: 23.4% (13 countries)
   4. Pictogram-text-pictogram: 8.9%
   5. Pictogram-pictogram-text: 3.6%
   6. Full matrix: 6.9%
   7. Graphical displays: 0.8%

3. Most common matrix resolution for pictograms: 64x64 and 32x32 pixels
4. Color inverted pictograms predominate
5. Combined pictogram-text most common and then pictogram only VMS
6. Most common text configuration: 3 lines of text (either of 13-18 characters or more than 18 characters per line)
7. Display of lowercase vs. capital letters: 50/50

Pure iconic [1, 6, 7]: 37.4%
Pure text [2]: 25.9%
Mixed [3, 4, 5]: 36.7%
Main results

SIGNING FUNCTIONS
1. VMS main function: informing (38.3%), danger warning (26.7%), regulate (19.9%)
2. Specific operational functions: others (33.8% - campaign messages, lane control, queue warning)... lane assignment (22.1%), rerouting (21.1%), speed assignment (18.7%)... truck parking (4.3%)

ROAD/TRAFFIC ISSUES: SAFETY, MOBILITY, MAINTENANCE
1. Weather, Congestion, Road works, Traffic flow information: 59.0%
2. Rerouting, dynamic traffic management, unplanned events, accidents and preannouncements: 29.7%
MAIN POINTS

VMS are commonly used
VMS impact seen as local in nature: this VMS here, drivers at the spot – considerable mix of different VMS types.
Drivers are pictured as VMS polyglots: they can read any configuration, there is no ideal way for drivers to understand information displayed on VMS while they drive
VMS rely on text, i.e., on natural language
MAIN POINTS

“The contents of VMS messages are most probably not international, as posted signs are. The main reason for this statement is not only our knowledge about specific national signing practices... but it also results as a logical conclusion considering the different configurations of VMS that have been actually purchased, mounted and are being used”.

The mixed icon-text VMS is common
Only 6.9% of VMS are full-matrix
WAY FORWARD: improve grammar

- Keep developing studies to determine the necessary elements: pictograms, alphanumeric characters, abbreviations, Europeanisms
- Keep developing studies to bring on the icon syntax enhancing VMS internationality, at least for events location and direction of variable events
WAY FORWARD: Haitz’s law, 7 years to go...

Flux/Lamp & OEM Cost/Lumen

-10x/decade

Flux/Lamp +20x/decade

GaAsP
GaAs
GaAsP:N
GaP
GaAlAs
GaAllnP

WP.1 66th Session. Geneva, September 25th 2013
Complex road signs: spatial syntax for iconic communication

Making the most of cheap and efficient LED: towards full iconic complex road signs, that are easy to read and comply with the 1968 Convention semiotic roots.
Thanks a lot for your attention!

Any question?
Any suggestion?
lucalba@unizar.es