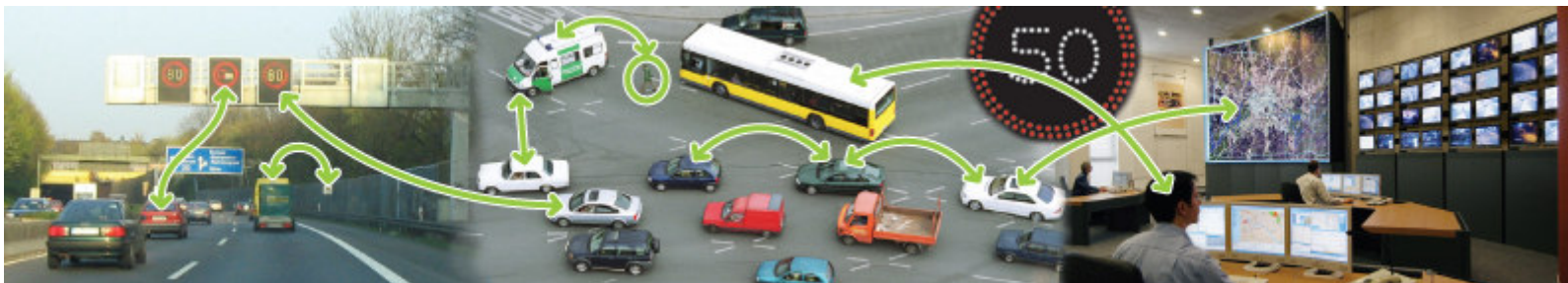




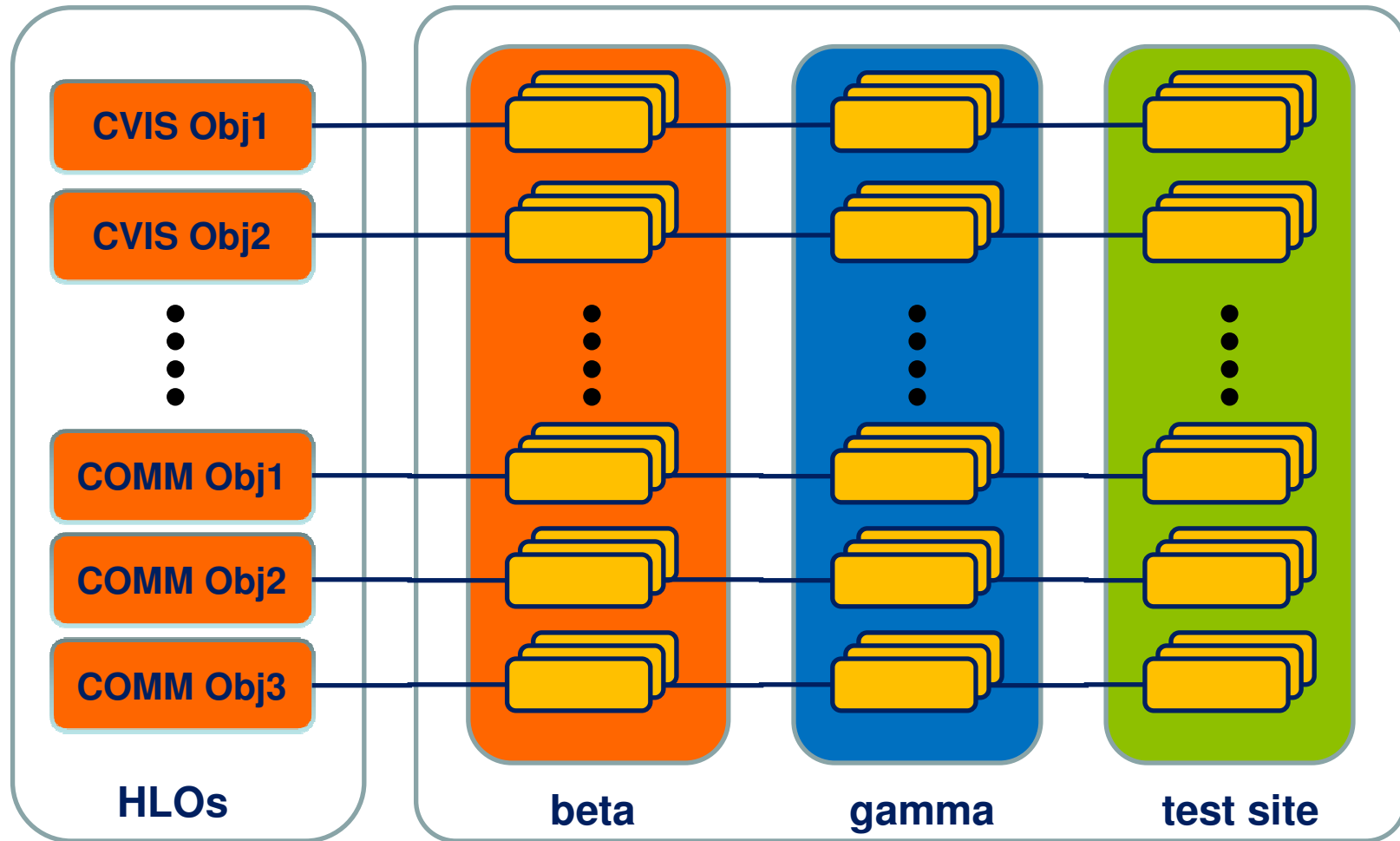
CVIS: Validation Results

Bart Driessen - TNO
May 21st, 2010
Brussels, Ertico



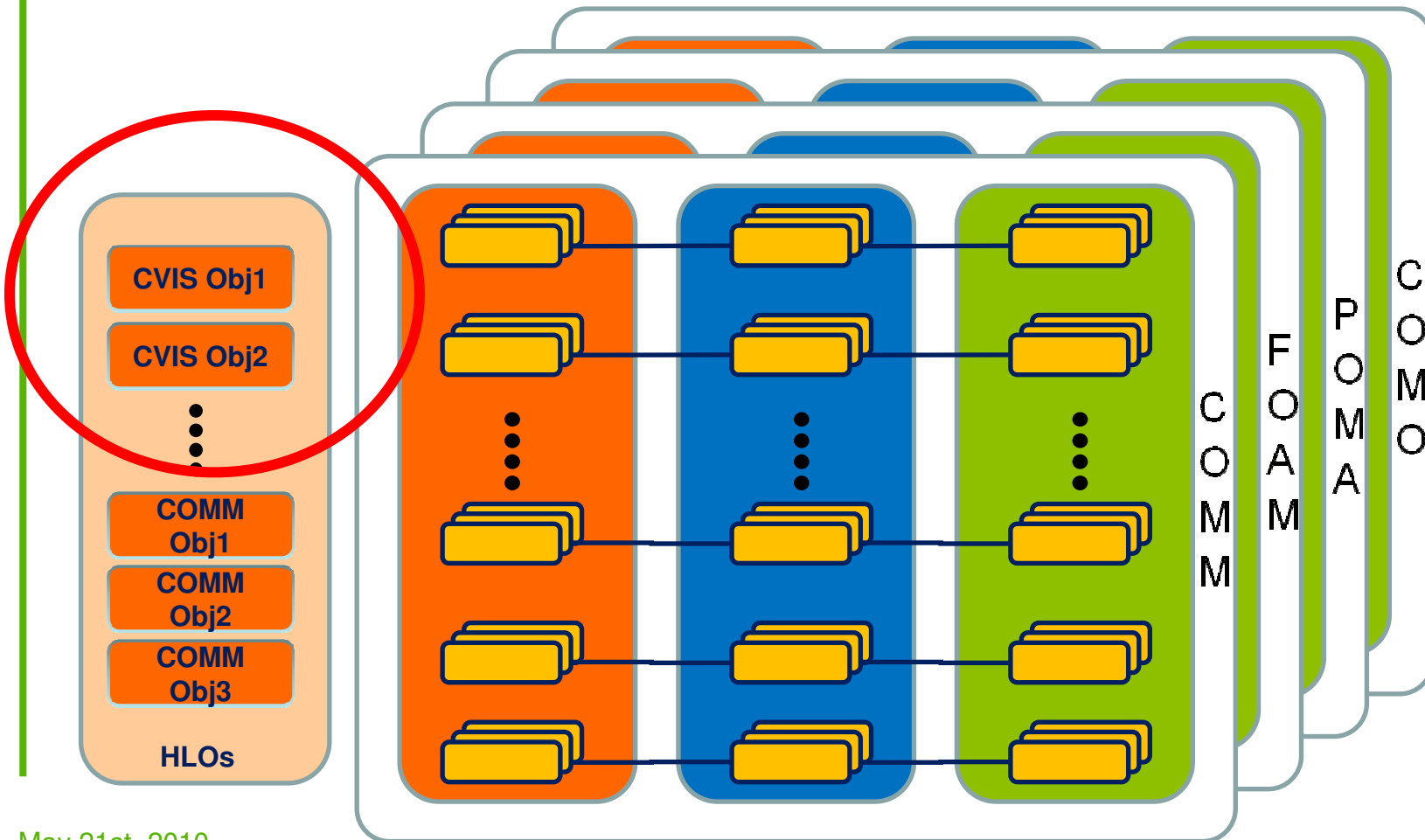


Validation stages





Validation results





Main high level objectives



- Interoperability
- Open source
- Reference platform
- User acceptance
- Privacy
- Impact on driver behaviour



CVIS-OB1: Interoperability



- Project objective:
 - Demonstrate interoperability across vehicles from different suppliers and between vehicles and roadside equipment.
- Target
 - 100% interoperability across 3 different makes of vehicle and 4 different test site implementations
- Validation actions:
 - Inspection at test sites
 - Technical interoperability tests in SPs
 - Questionnaires:
 - Event organisers
 - SP leaders (intra-project)



CVIS-OB1: Validating interoperability



Country	Test site	#RSU locations	#OBUs	#vehicle makes
Sweden	Gothenburg	0	3	3
	Stockholm	8	6	3
France	Lyon	2	1	1
	Versailles	1	2	1
Germany	Dortmund	4	3	2
	Hessen	7	5	3
Netherlands/Belgium	Helmond	1	5	3
	Amsterdam	15	13	3
	Rotterdam/Antwerp	0	1	1
UK	London	1	10	8
Italy	Firenze	0	1	1
	Bologna	2	2	1
	Turin	4	2	1
Norway	Trondheim	6	2	2
Total		51	56	



Some questionnaire results



- Setting up proper communication environment was not straightforward:
 - IPv6
 - M5
- Integration with FOAM was considered a relatively smooth process.
- Parallel project organisation (coretech as well as applications) was considered not optimal:
 - Components were shared without proper testing.
 - Components were shared without proper documentation.
- ➔ Poor integration / interoperability with COMO results (CINT).
- ➔ Late LDM availability caused project delays. CURB chose an alternative development traject.
- AGORA-C encoding / decoding mechanism did not produce full interoperable systems.



More questionnaire results



- CVIS and SAFESPOT can run in parallel on the same platform:
 - Routers can be shared.
 - Usage of same CALM communication stack.
 - They both understand CAM messages for beaconing.
 - Sharing data requires dedicated tools, since the communication architecture for both projects is different.
- Interoperability between CVIS and COOPERS has not been demonstrated.



CVIS-OB1: Interoperability conclusion



- 56 vehicles has been used at 14 test sites in 7 countries.
- 51 RSU locations were involved.
- Vehicles covered more than 3 vehicles makes.
- **CVIS-OB1 has been fully reached**
- CVIS and SAFESPOT show interoperability.
- CVIS and COOPERS have demonstrated no interoperability.
- Intra-project interoperability has been achieved, but not for 100%.



CVIS-OB2: Open source



- Project objective:
 - Development of generic open source interfaces and modules for the cooperative exchange of data (V2V / V2I).
- Target:
 - 80% of drivers, operating system elements and application software are under open-source licence.
- Validation actions:
 - Questionnaire for self assessment
 - Aggregating all results



CVIS-OB2: Open source



SP	Comment	Concl.
COMM	20 from 23 packages open source	P
FOAM	Mixture of open and closed sources. FOAM test suites fully open source. Include OSGI yes or no?	P/F
POMA	Many extensions of commercial code resulted in low level of open source.	F
COMO	Data fusion / traffic state calculation are strategic know how for companies.	F
CINT	Counting modules results 60% open source.	F
CURB	Many modules under BSD license. Approximately 50% open source.	F
CF&F	Many extensions of commercial code resulted in low level of open source.	F



CVIS-OB2: Conclusion



- CVIS uses Ubuntu Linux, which is an **open source operating system**.
- FOAM uses the (open source) **Knopflerfish service platform**.
- **These components were not developed in the CVIS project.**
- For the components that were developed during the CVIS lifespan, only **COMM is considered to have passed the 80% criterion**.
- All other subprojects did, individually, **not fulfil the open source requirement on itself**.
- Taking into consideration the operating system and the Knopflerfish service platform, the percentage of open source software significantly increases.
- **It can be concluded that when these components are included in the measurement, the vast majority of the required software is under open source license.**
- **A binary passed/failed is difficult to supply.**



CVIS-OB3: Reference platform



- Project objective:
 - Create open reference platform with pluggable communication interfaces with IPv6 mobile routing capability.
- Target:
 - 20 CVIS units are delivered to application developers and test site managers, that can work with all intended communication interfaces, and deliver mobile IPv6 routing capacity
 - Open design developers kit is available.
 - Helpdesk operational
- Validation action:
 - Inspection
 - Application innovation contest



CVIS-OB3



Country	Test site	#RSU locations	#OBUs	#vehicle makes
Sweden	Gothenburg	0	3	3
	Stockholm	8	6	3
France	Lyon	2	1	1
	Versailles	1	2	1
Germany	Dortmund	4	3	2
	Hessen	7	5	3
Netherlands/Belgium	Helmond	1	5	3
	Amsterdam	15	13	3
	Rotterdam/Antwerp	0	1	1
UK	London	1	10	8
Italy	Firenze	0	1	1
	Bologna	2	2	1
	Turin	4	2	1
Norway	Trondheim	6	2	2
Total		51	56	



CVIS-OB3



- Software developers kit:
 - Software repository:
 - <https://cvis.be>
 - certificate needed
 - Includes sources, installation guides, FAQ, documentation (Wiki).
- Some SPs more complete than others.
- Being discussed: organisation of this repository after CVIS lifetime.



CVIS
COOPERATIVE VEHICLE-INFRASTRUCTURE SYSTEMS

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Dangerous Goods application

TODO

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CVIS cff
<http://www.cvis.be/>

FOAM [

POMA [



CVIS-SUP



CONTACT

- [CVIS Linux R6 released](#) -- Posted on 2009-02-10 15:31 ; author [vilmos.nebehaj@ramsys.hu](#) ; categories [releases](#) [cvis](#) [r6](#) [announcements](#)
- [Ubuntu Repository Issues](#) -- Posted on 2008-12-13 15:17 ; author [jozsef.kovacs@ramsys.hu](#)
- [CVIS Linux PR5 Released](#) -- Posted on 2008-09-04 21:29 ; author [jozsef.kovacs@ramsys.hu](#) ; categories [releases](#)
- [CVIS-COMM News](#) -- Posted on 2008-09-04 18:51 ; author [jozsef.kovacs@ramsys.hu](#)

CVIS COMM documentations

Community

Page	Description
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CVIS Application Innovation Contest



- Aiming to stimulate innovation, and validate the usability of the reference system.
- Basis: FOAM SDK 1.4.
- 6 weeks for product development.
- 22 concepts were submitted.
- 9 applications selected:
 - 3 showed poor software development.
 - Leaving 3 (partner) and 3 (external) apps.
 - 4 applications were invited to the ITS Stockholm.



And the winner is...

Halmstad University's pedestrian warning system.





CVIS-OB3: Reference platform conclusions

- Reference platform availability objective has been reached.
- Improvements could be made on the completeness of the software repository.





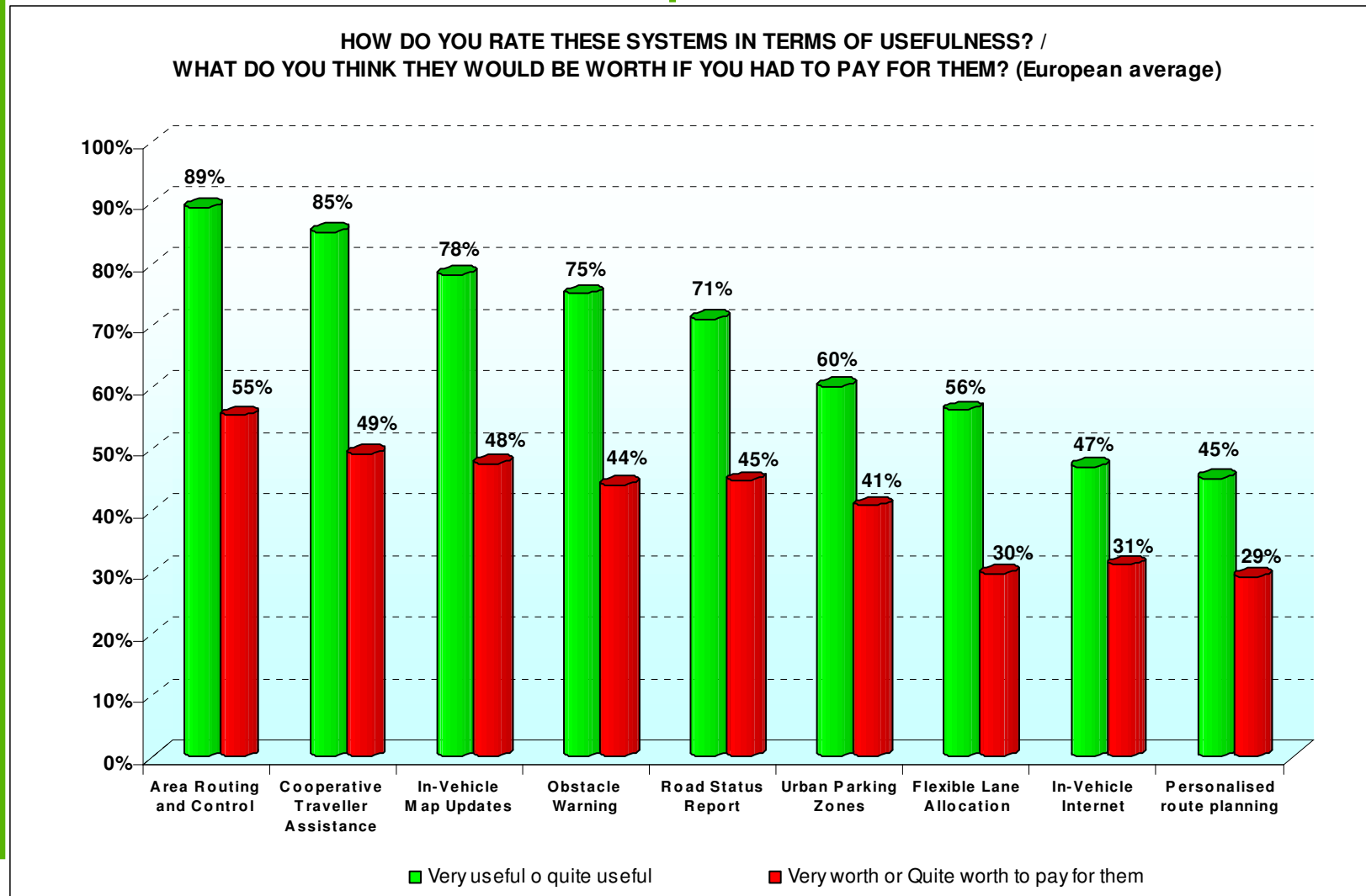
CVIS-OB4: User acceptance



- Project objective:
 - Show that CVIS equipment and servers are accepted by the general public, and perceived to provide added value.
- Target:
 - 75% of sample of end users have a positive or neutral attitude to the acceptance and benefits of CVIS on-board equipment and applications
- Validation actions:
 - End user questionnaire
 - Simulator study
 - Event questionnaire
 - Freight operators questionnaire (TS London)

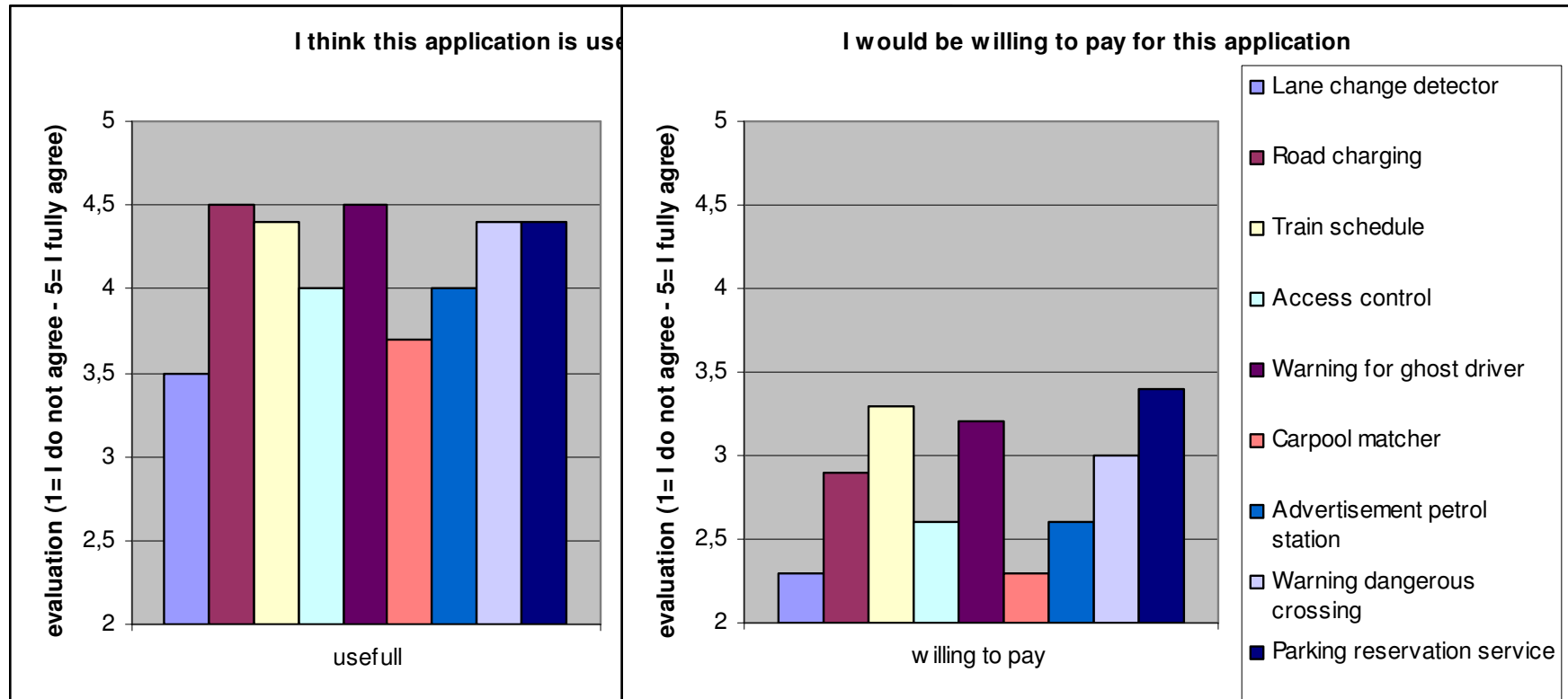


CVIS-OB4: User acceptance RACC questionnaire





CVIS-OB4: User acceptance ITS Stockholm

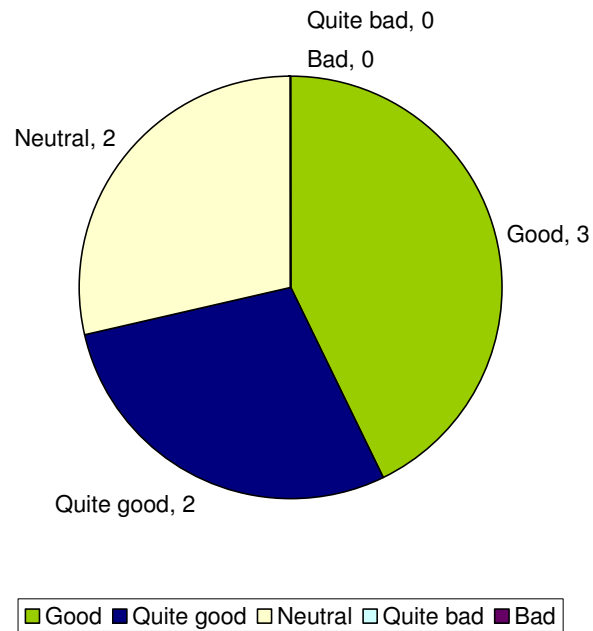




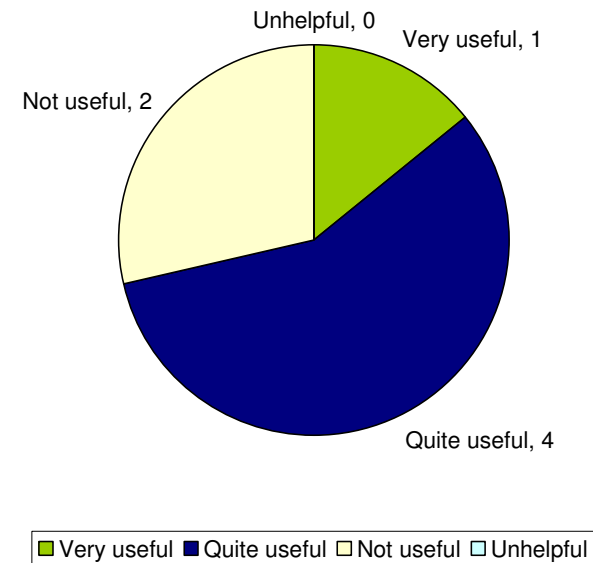
CVIS-OB4: User acceptance Freight operators



Q2.1: How did you rate your overall experience of the CVIS Trials?



Q2.2: How did you rate the usefulness of the Urban Parking Zones application?





CVIS-OB4: User acceptance

Conclusion



- Based on the outcomes of all questionnaires we can conclude that:
 - The majority of the end-users considers the presented applications to be useful.
 - The majority of the end-users considers the presented applications to be easy to use
- However, end-users are less enthusiastic to pay for these services...



CVIS-OB5: Data privacy



- Project objective:
 - Show that a majority of end users of CVIS systems are willing to allow the use of data collected from their vehicle and journey, as input to cooperative monitoring services.
- Target:
 - Over 50% acceptance of a sample of end users for release of floating vehicle and journey destination data
- Validation actions:
 - Questionnaire end users
 - Inspection results DEPN Topic 3



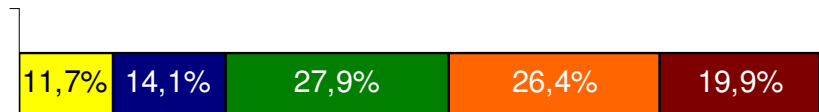
CVIS-OB5: Data privacy



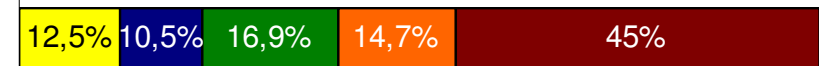
DATA PRIVACY (I)

■ Don't agree ■ 2 ■ 3 ■ 4 ■ Agree

I would be interested in these systems even through they might not be operative all the time (travelling by different countries, areas with no technical infrastructure, etc)



If these systems invade my privacy, I don't want to use them



Although these systems could invade my privacy I wouldn't mind because I think they are very useful



I would agree to be geographically located only if no personal data is involved (only car data)



0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

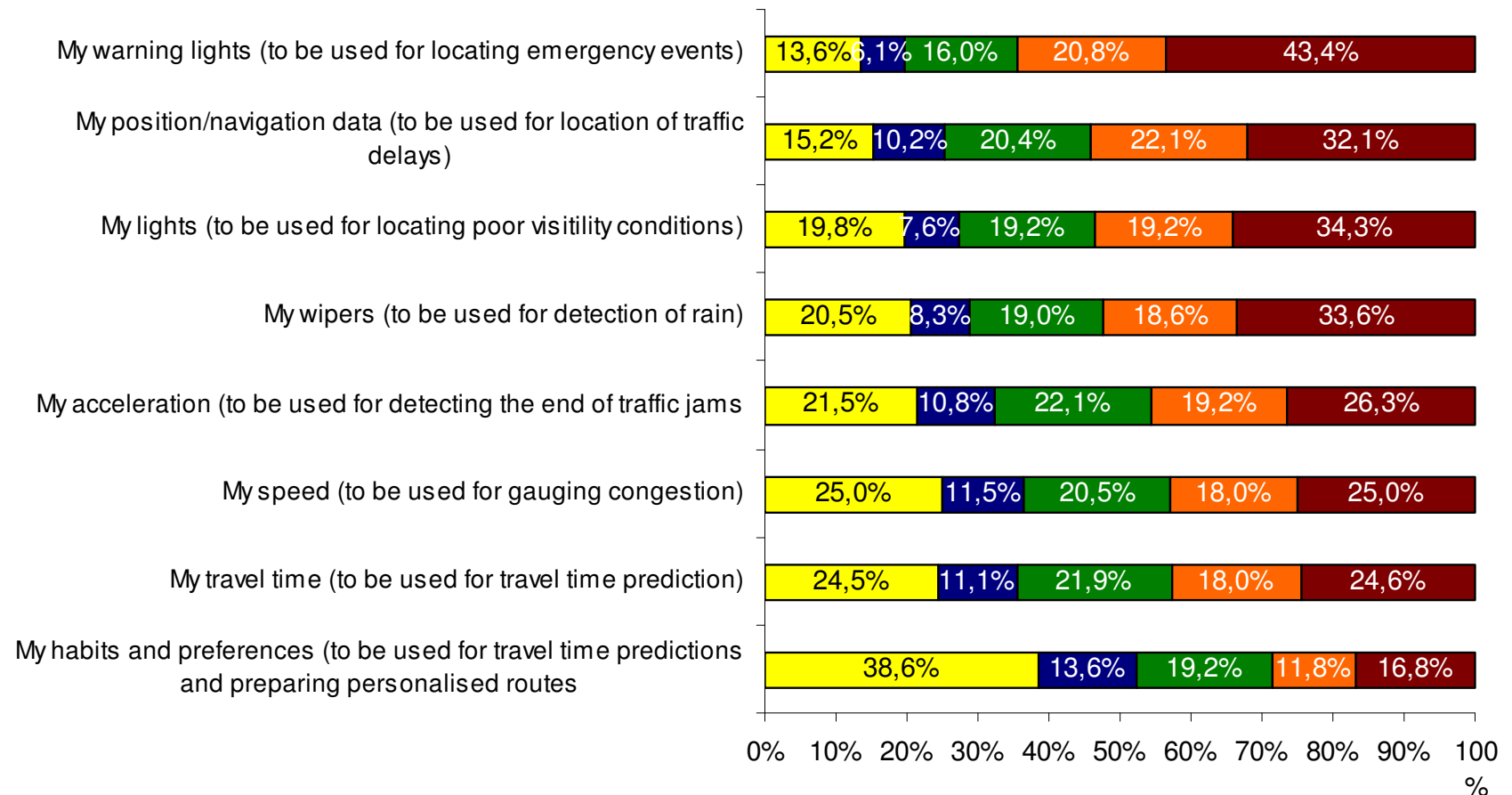


CVIS-OB5: Data privacy



DATA PRIVACY (II)

■ Not at all ■ 2 ■ 3 ■ 4 ■ Accept





CVIS-OB5: Data privacy conclusions



- European drivers (60%) are willing to share their data for supporting cooperative systems as long as no personal data is involved.
- The eSecurity Working Group elaborates a Code of Practice to deal with privacy issues related to cooperative systems.
- CVIS contributes via eSecurity Working group to the work plan of the Article 29 WP.



CVIS-OB6: Driver behaviour



- Project objective:
 - Show that users are willing and likely to adopt cooperative driving and adapt travel behaviour in order to realise benefits themselves.
- Target:
 - Over 50% driver acceptance to adopt recommendations for speed, route etc. provided by traffic centre
- Validation actions:
 - ...



CVIS-OB6: Driving behaviour impact



- Could (unfortunately) not be tested during the project lifetime:
 - Requires a large number of vehicles,
 - driving in a realistic context,
 - using applications that are further in the product development lifecycle (instead of proof of principle)
- Field Operational Tests are needed!!!



SP level validation



Statistics on SP validation



- All SPs produced their validation reports.
- A total of 24 high level objectives have been validated.
- These HLO were assessed using more than 100 validation tests.
- The HLO could be rated:
 - Totally failed (1)
 - Mostly failed (2)
 - Neutral (3)
 - Mostly passed (4)
 - Fully passed (5)
- The lowest rating was: Neutral
- The highest rating was: Totally passed
- The average rating was: 4.1

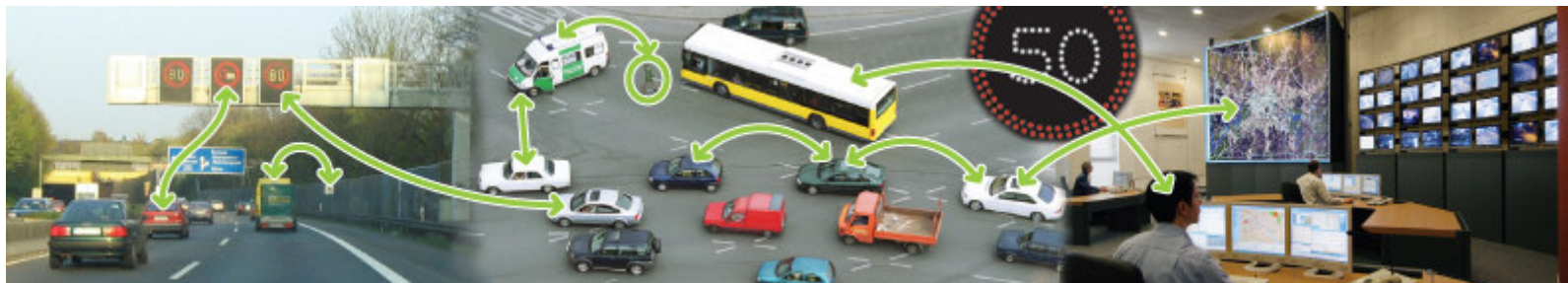
Details are contained in more than 1000 pages validation results documentation that will appear on the CVISproject.org website as soon as they are officially accepted.



Thanks for your attention...

Bart Driessen
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www.cvisproject.org





Agenda – afternoon

applications / testsites



Time	Topics	Speaker
12:45	Cooperative applications	Marcel Konijn (LOGICA)
13:15	Test site experiences	Robin North (CTS/IMPERIAL)
13:45	Interoperability	Knut Evensen (Q-FREE)
14:00	Overall validation of CVIS	Bart Driessen (TNO)
Coffee break		
14:40	Exploitation – planned work after CVIS	Zeljko Jetic (ERTICO)
15:00	Panel discussion – CVIS results	Paul Kompfner (ERTICO)
	Panel discussion – Towards deployment	Paul Kompfner (ERTICO)
16:30	Workshop close	

