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Round Table

Dr. Evangelos Bekiaris

CERTH/HIT Director



www.safestrip.eu



Topics

- Ranking of SAFE STRIP target Use Cases
- Context of Use
- Expected impacts
- Business Scenarios
- WTH & WTP
- SAFE STRIP & C-ITS
- Security, Safety and other Concerns



Use Cases ranking (in order of importance)

What we have so far

From the Drivers/Riders' point of view

- 1. Merging/ intersection support**
- 2. Advanced Driver & Rider Assistance Systems adaptation for equipped vehicles (“Enhanced ADAS/ARAS”)**
- 3. Virtual Advanced Driver & Rider Assistance Systems for non-equipped vehicles (“Virtual ADAS/ARAS”)**
- 4. Road workzones and (uprotected) railway crossing warning**
- 5. Road wear level and predictive road maintenance**
- 6. Autonomous vehicles support**
- 7. Personalised VMS/VDS and Traffic Centre Information**
- 8. Parking booking and charging**
- 9. Virtual Toll Collection**

From the OEM's point of view

- 1. Merging/ intersection support**
- 2. Advanced Driver & Rider Assistance Systems adaptation for equipped vehicles (“Enhanced ADAS/ARAS”)**
- 3. Road wear level and predictive road maintenance**
- 4. Virtual Advanced Driver & Rider Assistance Systems for non-equipped vehicles (“Virtual ADAS/ARAS”)**
- 5. Road workzones and (uprotected) railway crossing warning**
- 6. Autonomous vehicles support**
- 7. Personalised VMS/VDS and Traffic Centre Information**
- 8. Virtual Toll Collection**
- 9. Parking booking and charging**



Use Cases ranking (in order of importance)

What we have so far

From the Road Infrastructure Operators point of view

- 1. Road workzones and (unprotected) railway crossing warning**
2. Advanced Driver & Rider Assistance Systems adaptation for equipped vehicles (“Enhanced ADAS/ARAS”)
- 3. Personalised VMS/VDS and Traffic Centre Information**
- 4. Merging/ intersection support**
5. Autonomous vehicles support
6. Virtual Toll Collection
- 7. Parking booking and charging**
8. Road wear level and predictive road maintenance
9. Virtual Advanced Driver & Rider Assistance Systems for non-equipped vehicles (“Virtual ADAS/ARAS”)

From the Road Integrators/Constructors point of view

- 1. Road workzones and (unprotected) railway crossing warning**
2. Road wear level and predictive road maintenance
- 3. Personalised VMS/VDS and Traffic Centre Information**
- 4. Merging/ intersection support**
5. Virtual Advanced Driver & Rider Assistance Systems for non-equipped vehicles (“Virtual ADAS/ARAS”)
6. Advanced Driver & Rider Assistance Systems adaptation for equipped vehicles (“Enhanced ADAS/ARAS”)
- 7. Parking booking and charging**
8. Autonomous vehicles support
9. Virtual Toll Collection

Use Cases ranking (in order of importance)

What we have so far

From the Researchers point of view

1. Advanced Driver & Rider Assistance Systems adaptation for equipped vehicles (“Enhanced ADAS/ARAS”)
2. Merging/ intersection support
3. Road wear level and predictive road maintenance
4. Virtual Advanced Driver & Rider Assistance Systems for non-equipped vehicles (“Virtual ADAS/ARAS”)
5. Road workzones and (unprotected) railway crossing warning
6. Autonomous vehicles support
7. Personalised VMS/VDS and Traffic Centre Information
8. Parking booking and charging
9. Virtual Toll Collection



Use Cases ranking (in order of importance)

What do you think?

Target SAFE STRIP application	Rank [1-9]
Virtual Advanced Driver & Rider Assistance Systems for non-equipped vehicles (“Virtual ADAS/ARAS”)	
Advanced Driver & Rider Assistance Systems adaptation for equipped vehicles (“Enhanced ADAS/ARAS”)	
Road wear level and predictive road maintenance – for the TMC operators	
Road workzones and (uprotected) railway crossing warning	
Merging/ intersection support	
Personalised VMS/VDS and Traffic Centre Information	
Autonomous vehicles support: enhanced friction & lane position data; lane – level virtual corridors in highways; automated toll collection; working zones safety function	
Virtual Toll Collection - for non-autonomous vehicles	
Parking booking and charging	
Other (please define):	
Other (please define):	
Other (please define):	



Context of use

What do you think?

Do you think that SAFE STRIP is going to be more valuable:

For equipped vehicles

For non-equipped vehicles



Context of use

What do you think?

Target SAFE STRIP application	Traffic context	Vehicle clusters	Environmental/external conditions sensing
“Virtual ADAS/ARAS”	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define
“Enhanced ADAS/ARAS”	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define



Context of use

What do you think?

Target SAFE STRIP application	Traffic context	Vehicle clusters	Environmental/external conditions sensing
Road wear level and predictive road maintenance – for the TMC operators	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define
Road workzones and (uprotected) railway crossing warning	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define



Context of use

What do you think?

Target SAFE STRIP application	Traffic context	Vehicle clusters	Environmental/external conditions sensing
Merging/ intersection support	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define
Personalised VMS/VDS and Traffic Centre Information	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define



Context of use

What do you think?

Target SAFE STRIP application	Traffic context	Vehicle clusters	Environmental/external conditions sensing
Autonomous vehicles support	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define
Virtual Toll Collection - for non-autonomous vehicles	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define



Context of use

What do you think?

Target SAFE STRIP application	Traffic context	Vehicle clusters	Environmental/external conditions sensing
Parking booking and charging	<input type="checkbox"/> urban <input type="checkbox"/> rural <input type="checkbox"/> highway <input type="checkbox"/> interurban	<input type="checkbox"/> passenger cars <input type="checkbox"/> motorcycles/PTWs <input type="checkbox"/> trucks <input type="checkbox"/> buses <input type="checkbox"/> trains <input type="checkbox"/> other, please define	<input type="checkbox"/> rain (level of humidity) <input type="checkbox"/> snow <input type="checkbox"/> ambient light <input type="checkbox"/> fog <input type="checkbox"/> ice <input type="checkbox"/> wind <input type="checkbox"/> road works <input type="checkbox"/> unprotected railway crossing <input type="checkbox"/> other, please define
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Other Critical Info to be transmitted

What do you think?

- | | |
|---|--------------------------|
| Position in lane | <input type="checkbox"/> |
| Speed limit | <input type="checkbox"/> |
| Static obstacle ahead | <input type="checkbox"/> |
| Heavy traffic ahead | <input type="checkbox"/> |
| Changed/new information about upcoming exit | <input type="checkbox"/> |
| Other (please define): | |





Key Business Scenarios

What we have so far – From the Drivers/Riders

Business Cases	Short (up to 2020)	Mid (up to 2030)	Long (up to 2050)
<p>Business Case 1: Info-nodes ORU's are installed at selected infrastructure sites (i.e. before bridges or toll stations, sharp curves & other black spots), providing speed or other static warnings to vehicles. A very low cost and limited functionality application. These will become info-nodes in the infrastructure such as info-kiosks in public services.</p>	✓	<input type="checkbox"/>	<input type="checkbox"/>
<p>Business Case 2: Mobile SAFE STRIPS SAFE STRIPS will be integrated into temporary pavement warning products and applied for time-limited periods to signify road works or support drivers/ riders during adverse weather periods. They will be fast in realisation and potentially reusable.</p>	✓	<input type="checkbox"/>	<input type="checkbox"/>
<p>Business Case 3: SAFE STRIP plazas SAFE STRIPS will be integrated permanently in durable pavement warning products (potentially multiple strips) for merging, intersection and other key traffic scenario support, as well as replacing existing or newly needed VMSes.</p>	<input type="checkbox"/>	✓	<input type="checkbox"/>
<p>Business Case 4: Standardized SAFE STRIPS SAFE STRIPS may be standardized and applied widely whereas their vehicle interface will become standard vehicle equipment, thus leading to a rapid deployment rate of cooperative technologies, without need for additional on-board sensors.</p>	<input type="checkbox"/>	✓	<input type="checkbox"/>



Key Business Scenarios

What we have so far – From the OEM's

Business Cases	Short (up to 2020)	Mid (up to 2030)	Long (up to 2050)
<p>Business Case 1: Info-nodes ORU's are installed at selected infrastructure sites (i.e. before bridges or toll stations, sharp curves & other black spots), providing speed or other static warnings to vehicles. A very low cost and limited functionality application. These will become info-nodes in the infrastructure such as info-kiosks in public services.</p>	✓	<input type="checkbox"/>	<input type="checkbox"/>
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Key Business Scenarios

What we have so far – From the Road Operators

Business Cases	Short (up to 2020)	Mid (up to 2030)	Long (up to 2050)
<p>Business Case 1: Info-nodes ORU's are installed at selected infrastructure sites (i.e. before bridges or toll stations, sharp curves & other black spots), providing speed or other static warnings to vehicles. A very low cost and limited functionality application. These will become info-nodes in the infrastructure such as info-kiosks in public services.</p>	✓	<input type="checkbox"/>	<input type="checkbox"/>
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Key Business Scenarios

What we have so far – From the Road Constructors

Business Cases	Short (up to 2020)	Mid (up to 2030)	Long (up to 2050)
<p>Business Case 1: Info-nodes ORU's are installed at selected infrastructure sites (i.e. before bridges or toll stations, sharp curves & other black spots), providing speed or other static warnings to vehicles. A very low cost and limited functionality application. These will become info-nodes in the infrastructure such as info-kiosks in public services.</p>	✓	<input type="checkbox"/>	<input type="checkbox"/>
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Key Business Scenarios

What we have so far – From the Researchers

Business Cases	Short (up to 2020)	Mid (up to 2030)	Long (up to 2050)
<p>Business Case 1: Info-nodes ORU's are installed at selected infrastructure sites (i.e. before bridges or toll stations, sharp curves & other black spots), providing speed or other static warnings to vehicles. A very low cost and limited functionality application. These will become info-nodes in the infrastructure such as info-kiosks in public services.</p>	✓	<input type="checkbox"/>	<input type="checkbox"/>
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Key Business Scenarios

What do you think?

Business Cases	Short (up to 2020)	Mid (up to 2030)	Long (up to 2050)
<p>Business Case 1: Info-nodes ORU's are installed at selected infrastructure sites (i.e. before bridges or toll stations, sharp curves & other black spots), providing speed or other static warnings to vehicles. A very low cost and limited functionality application. These will become info-nodes in the infrastructure such as info-kiosks in public services.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Expected Impacts

What we have so far – “Average” feeling from all

1. Road Safety

2. Operational support for the operator

3. Traffic Efficiency

4. Mobility

5. Boost of C-ITS penetration

6. Comfort for the driver

7. Change of driving behavior or mobility patterns



Expected Impacts

What do you think?

Expected Impacts	Rank [1-7]
Road Safety	
Operational support for the operator	
Traffic Efficiency	
Mobility	
Boost of C-ITS penetration	
Comfort for the driver	
Change of driving behavior or mobility patterns	
Other (please define):	
Other (please define):	
Other (please define):	



Applications vs. Impacts

Ranking A, B, C – [A= Most relevant]

Target SAFE STRIP application	Road Safety	Operational support for the operator	Traffic Efficiency	Mobility	Boost of C-ITS penetration	Comfort for the driver	Change of driving behavior or mobility patterns	Other
“Virtual ADAS/ARAS”								
“Enhanced ADAS/ARAS”								
Road wear level and predictive road maintenance – for the TMC operators								
Road workzones and (uprotected) railway crossing warning								



Applications vs. Impacts

Ranking A, B, C – [A= Most relevant]

Target SAFE STRIP application	Road Safety	Operational support for the operator	Traffic Efficiency	Mobility	Boost of C-ITS penetration	Comfort for the driver	Change of driving behavior or mobility patterns	Other
Merging/ intersection support								
Personalised VMS/VDS and Traffic Centre Information								
Autonomous vehicles support								
Virtual Toll Collection - for non-autonomous vehicles								
Parking booking and charging								



Applications vs. Impacts

Ranking A, B, C – [A= Most relevant]

Target SAFE STRIP application	Road Safety	Operational support for the operator	Traffic Efficiency	Mobility	Boost of C-ITS penetration	Comfort for the driver	Change of driving behavior or mobility patterns	Other
Other (please define):								
Other (please define):								
Other (please define):								



Security Concerns

What we have so far

From the drivers/riders

1. Data privacy
2. How easy it is to get hacked?
3. System malfunctioning
4. Information reliability
5. Can this be used by authorities to record illegal driving?
6. Too much information/ distraction of driver's attention
7. Information mismatch between system and road signs
8. Driving become underestimated. Drivers become more lazy and careless.

From the OEM's

1. Can the system track users via ieee802.11p and cellular connectivity
2. Can system overwrite driver's intentions/ can it modify vehicle's behavior?
3. Unstable system and not functioning
4. Who and by what means can modify provided info

From the Road Operators

1. Data transmission
2. Who processes personal data?



Security Concerns

What do you think? [1 is the most important]

1.
2.
3.
4.
5.
6.





Willingness To Have

What do you think?

Would you like to have and benefit from SAFE STRIP?

Yes No



Willingness To Pay

What do you think?

Drivers

How much would you be willing to pay in order to benefit from the SAFE STRIP solution?

For Car, Bus, Truck:

- 0-20€ 20-50€ 50-100€
 100-500€ over 500€

For PTW:

- 0-20€ 20-50€ 50-100€
 over 100€

OEM

Would you be interested to have and benefit from SAFE STRIP with an extra equipment in your vehicle (microcontroller receiving real time info & processing unit supporting decision making)?

- Yes No

If Yes, what would be an acceptable cost per vehicle?

For Car, Bus, Truck:

- 0-20€ 20-50€ 50-100€ 100-500€
 over 500€

For PTW:

- 0-20€ 20-50€ 50-100€ over 100€



Willingness To Pay

What do you think?

Infrastructure Operators

1. How much would you pay for the SAFE STRIP solution integration/installation in your infrastructure, taking into consideration that it is envisaged to replace future investment in VMS, VDS, Toll Stations?

.....€

2. How much would you pay for the SAFE STRIP solution annual maintenance?

.....€



SAFE STRIP & C-ITS

What do you think?

Do you think SAFE STRIP should be included in the next C-ITS roadmap?

Yes No



Advantages

What do you think?

- According to survey respondents, possible advantages of SAFE STRIP compared to other relevant solutions are:
 - Expected to be of low cost
 - Real-time prediction of road maintenance
 - Autonomous functions support
- **What is your opinion?**



Disadvantages

What do you think?

- According to survey respondents, possible disadvantages of SAFE STRIP compared to other relevant solutions are:
 - Exposed to environmental conditions
 - Cost of implementation
- **What is your opinion?**





Integration of SAFE STRIPS

What do you think?

- Road operators seem to prefer the option of SAFE STRIPS being permanently attached on the road

What is your opinion?

- **Do you think the installed strip should be permanently attached on the road or detachable?**

Permanent

Detachable

Free Discussion

- **Legal/regulatory/operational barriers**
- **Safety concerns**
- **Technical, legal, operational concerns**
- **Conflicts with other existing or emerging technologies**
- **Key risks regarding the implementation of the proposed solution**

Thank you for your feedback!

The SAFE STRIP Consortium

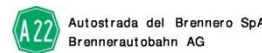


Coordinator



CERTH
CENTRE
FOR RESEARCH
& TECHNOLOGY
HELLAS

Technical & Innovation Manager



National Research Council of Italy

