



Safer To School



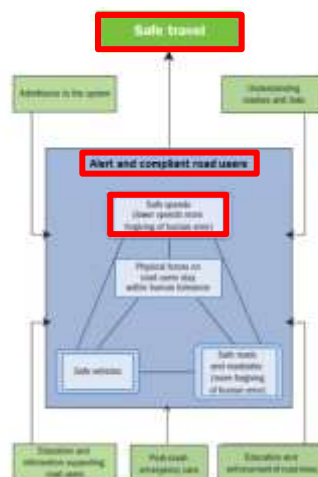
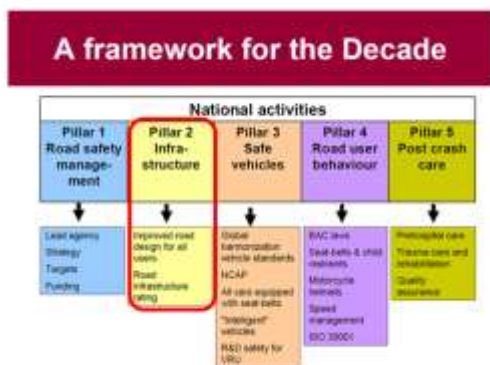
REPUBLIKA SLOVENIJA
MINISTRSTVO ZA INFRASTRUKTURO
 DIREKCIJA REPUBLIKE SLOVENIJE ZA INFRASTRUKTURO

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1



Systematical approach



2



Infrastructure and intuitive road design



3



Credible speeds – intuitive road design



Is this self-explaining road design?

4



Self-explaining – intuitive road design



5



Main challenge – how to provide credible information to drivers?

- How to provide Self-explaining roads?
- How to make speed limits credible?
- How to encourage drivers to be more attentive / alert when driving near Schools / Children?
- As we all know „just setting up traffic signs“ does not help improving Road Safety (otherwise Slovenia would be much safer than some of the Nordic countries).

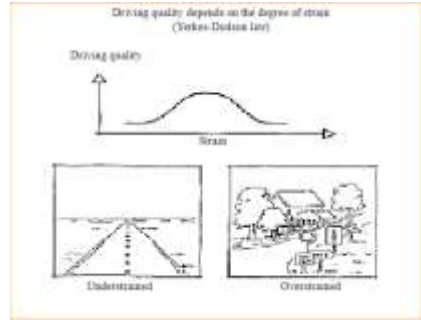
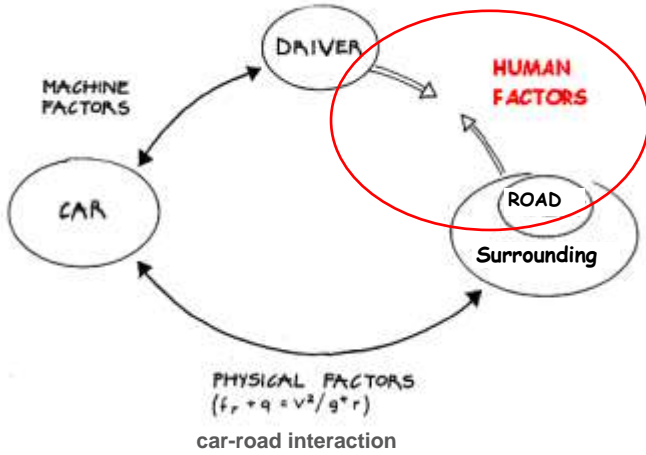


6



Human Factors in road design

Source: <https://www.piarc.org/en/knowledge-base/road-safety/Technical-Reports/Road-Safety/>



7



Some cases from abroad (spatial planning / urbanism)



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Some cases from abroad (spatial planning / urbanism)



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Some cases from abroad (spatial planning / urbanism)



10



Slovenian approach



11

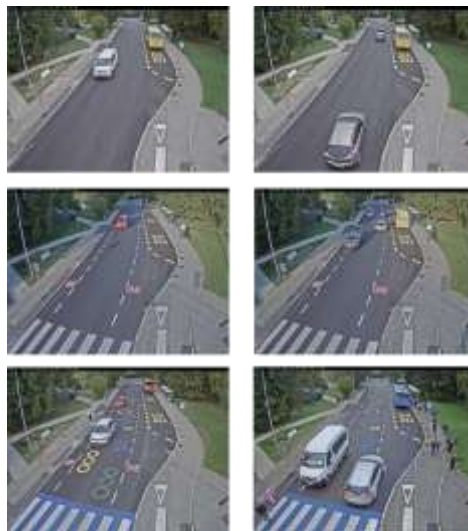


Monitoring - evaluation

Hidden speed measurements:

- before
- ↓
- after
- ↓
- After/after
- ↓
- After/after/after

Video monitoring:



Surveys:

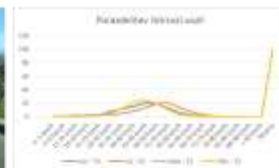
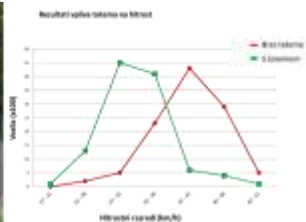
- Comprehensibility
- „hidden“ questions if drivers understand the meaning of road re-design and how do they behave/act (also proven by hidden speed measurements)

12



Results and main indicators

(reducing of speed – no more extreme speeds and more attentive driving)

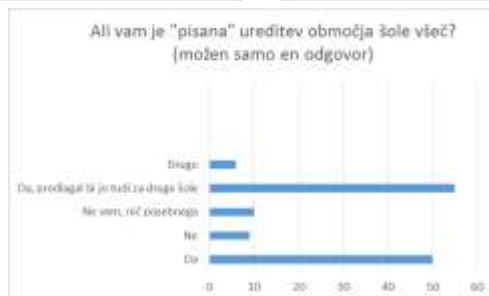
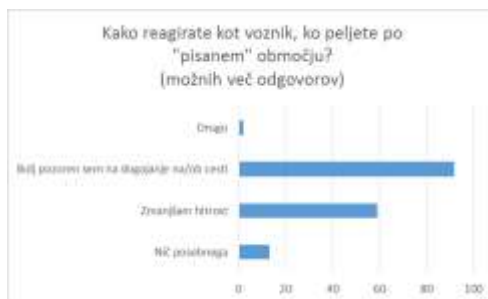
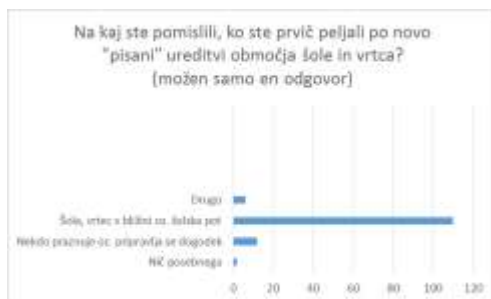


13



Results and main indicators

(reducing of speed – no more extreme speeds and more attentive driving)



14



Road narrowing – color lane

(reducing of speed – no more extreme speeds and more attentive driving)



15



Speed measurements

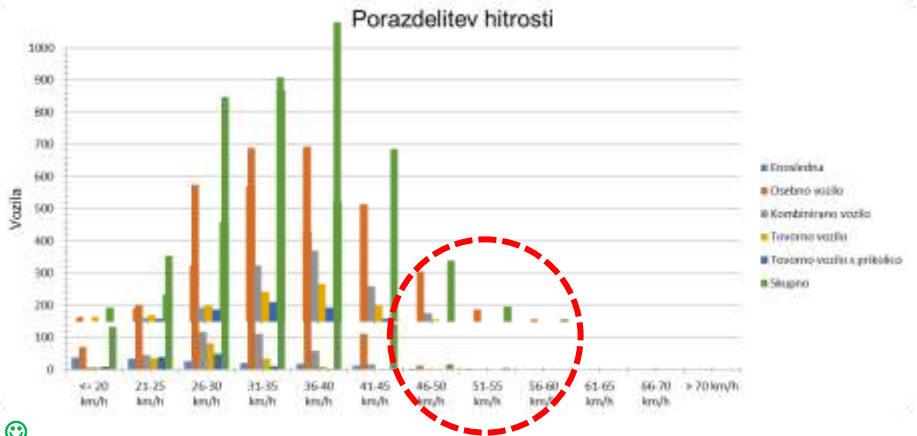
AFTER

V85 = 37 km/h

V50 = 31 km/h

V30 = 28 km/h

V95 = 41 km/h



Reduction of speed for 6 km/h 😊

BEFORE

V85 = 43 km/h

V50 = 37 km/h

V30 = 34 km/h

V95 = 47 km/h

16



Results and main indicators

(reducing of speed – no more extreme speeds and more attentive driving)

- We can fairly say that the project is a success and has beneficial results on driver behavior – **speed and attention**.
- By thoughtful incorporation of Human Factors knowledge in to the road design, we can enhance Road Safety, and at the same time tackle nowadays ever-growing problem on drivers' Distraction and Fatigue.



17



Monitoring of effectiveness and changing the Roads Act

(3) Traffic calming measures are technical solutions on the road that, through their design, calm traffic (e.g. tree planting, **structural and color treatment of traffic areas, urban equipment**).



18



In order for these measures to be unified and systemically introduced throughout the country, the Directorate of Infrastructure of the Republic of Slovenia started to produce the "Safer to School" guidelines.

<https://www.gov.si/zbirke/storitve/smernice-za-postavitev-in-izvedbo/>

and we made an Investment Project Identification Document so that we secured financial resources for the systematical project implementation on state roads (1.500.000 annually - if...).



19



School transport (Status quo)



(4) When a vehicle that is specially marked for the transport of a group of children and has its safety lights on, because children are getting in or out, is stopped on a directional carriageway, overtaking for vehicles driving on the same directional carriageway is not permitted, vehicle drivers, those driving past on the directional carriageway for driving in the opposite direction must drive at a reduced speed and with special care and, if necessary, stop the vehicle

20



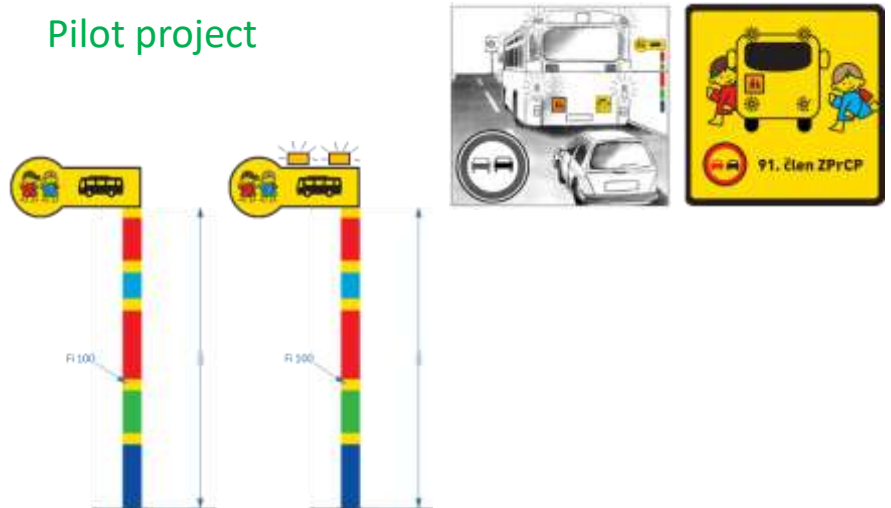
School bus stops / waiting areas



21



Pilot project



Display of passive warning and notification equipment (left) and active warning and notification equipment (right) for marking the school bus stop or waiting areas where schoolchildren wait for school transport

22



School bus stops / waiting areas



23



Results of pilot project #BUSko



<https://routesroadsmag.piarc.org/en/Routes-Roads-Magazine-Numero-384-385-26th-World-Road-Congress-General-Report/6161,Routes-Roads-Magazine-384-385-Implementation-of-the-system-for-alerting-drivers-at-the-presence-of-school-children-on-the-road-waiting-for-a-school-bus-BUSko#c616e734D94>

<https://www.piarc.org/en/activities/Routes-Roads-Magazine/33557>

24



WHAT'S NEW! Update

Implementation of the system for alerting drivers at the presence of school children on the road, waiting for a school bus – "BUSKO"

Štefan Babič, MSc, Senior Traffic Safety Officer, Slovenian Infrastructure Agency and MIRA, Rep. of Slovenia, Ljubljana

Using human factors knowledge, the Slovenian Infrastructure Agency (SIA) has, by implementing a road traffic safety educational design, developed a self-explaining system for alerting drivers at the presence of school children on the school paths and roads in vicinity of schools (school buses).

SLOWMAN SYSTEM "SAFER TO SCHOOL"

The need for such a system came from current "total stop" situation in Slovenia in school transport. In the vicinity of the domain of total community metropolitan nearby towns, we use already established bus stops for the purpose of school transport. There are often busy streets equipped with many lanes, leading to safety hazards for the children. Metropolitan area do not have the freedom to equip all waiting areas / school bus stops according to regulations, neither is such intervention economically reasonable, as these locations change through time and with each new generation of children (number of years of primary education) (1). (2).

The first pilot town, Road Traffic Police Act allows primary schools continue with special marking for school transport to stop on or by the road, outside bus stops, for children waiting at waiting the vehicle, while facing forward in both of their morning (right-hand) and afternoon (left-hand) school buses to stop on the road and pick up school children, waiting for school transport / school buses on such unapproved waiting areas.

The key message to present:

Using the system design engineers and psychologists, we first made a step forward by presenting a self-explaining alerting drivers at the presence of school children waiting for a school bus on the road, together with Municipality of Nova Gorica a pilot project was carried out on a state road RS-646/202, where school children wait on unapproved waiting areas for school transport / school bus.

The concept idea for the new SLOW system was taken from human factors safety research project (SAFE/2021/2022) (<https://www.slovenia.si/en/eng/>), which the design concept was taken from SIA's guidelines "Slovenian Road Traffic Safety" (3).

The pilot project was carried out with low speed zones and active. While passive system was set up using early

VARNEJE V ŠOLO

ZAKON OMEJUJE ZATO, DA VARUJE!

RESULTS OF IMPLEMENTING

Slowdown

Average speed has reduced on all treated after SLOW school bus stops. In some cases speed did not reduce greatly, the reason can be found in always low average speeds, good safety and visibility on the location in general. Change in speed in the greatest urban higher speeds were measured before getting up coloured boards.

We have been observing if the overall speed has reduced in general after setting up SLOW signs. More importantly, if the overall speed has reduced, it is more important, especially when active systems are triggered. Speed camera represents the time and number of children waiting for a school bus, while the red colour marks give the speed of departing vehicles. In many cases, drivers reduce their speed for about a half.

Signs making conscious and aware

Results are satisfying, with high rates of visibility and make us think the new system will be useful and will contribute to make the road a safer place for children (4) (5) (6).

The slow sign itself mostly the behaviour of the driver. They tend to stop sign at a crossing to take a look at the presence of the signal and assess the possible dangers. If no danger is detected, they continue to drive but at this critical time, they stop in a safer way. The green sign of low speed the speed can be 0-10 (7) (8) (9).

Over 95% of drivers understood the message, meaning that the information presented is more comprehensible and the design of the board self-explanatory (illustration 1). In this way, road driver communication is improved.

Illustration 1 - Road traffic sign system for alerting drivers at the presence of school children

Illustration 2 - Road traffic sign system for alerting drivers at the presence of school children

Illustration 3 - Road traffic sign system for alerting drivers at the presence of school children

Illustration 4 - Road traffic sign system for alerting drivers at the presence of school children

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Illustration 100 - Road traffic sign system for alerting drivers at the presence of school children

CONCLUSIONS

Pilot project provided preliminary positive results, showing reduction of road signs, furthermore, the system has proven that road signs clearly understand self-explaining road signs, but there are change that driving behaviour (acceleration) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100).

SLOW signs can be useful and their placement observation is remaining appropriate bus stops. In many cases it is not possible to make a full stop area and active sign is an available alternative to influence driver's behaviour and raise the level of safety. The system has also proven to be self-explanatory, efficient and accepted by the drivers, as they had to slow down, increase their attention and drive more cautiously when encountering SLOW signs (1).



WHAT'S NEW! Update

Over 95% of drivers reduce speed and more than 90% of drivers actively adjust speed to the road conditions, slowing down and so in accordance with principles and rules of road traffic (illustration 1).

Over 95% of drivers reduce speed and over 90% of drivers actively adjust speed to the road conditions and increase attention and observation in accordance with the principles and rules of road traffic (illustration 2).

Colour for boards clearly show a positive impact on the driver, slowing speed, attention and focus of driver, to traffic, especially in relation to active children.

More than 95% of the drivers read the road signs and more than 90% of drivers actively adjust speed to the road conditions, slowing down and so in accordance with principles and rules of road traffic (illustration 3).

Over 95% of drivers, like the SLOW concept, approximately 95% of drivers prefer the self-explaining colourful board and a half less more than 90% of drivers prefer the active. Redding colourful board (illustration 4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100).

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Challenges...



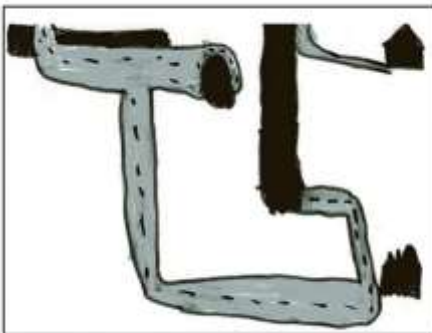
- Quality of designs / projects
- Quality of execution and products
- Maintenance
- Supervision
- Responsibility (of people involved)
- Systematical approach (other agencies...)

27



Still to-do...

Children's drawing of their trip to school

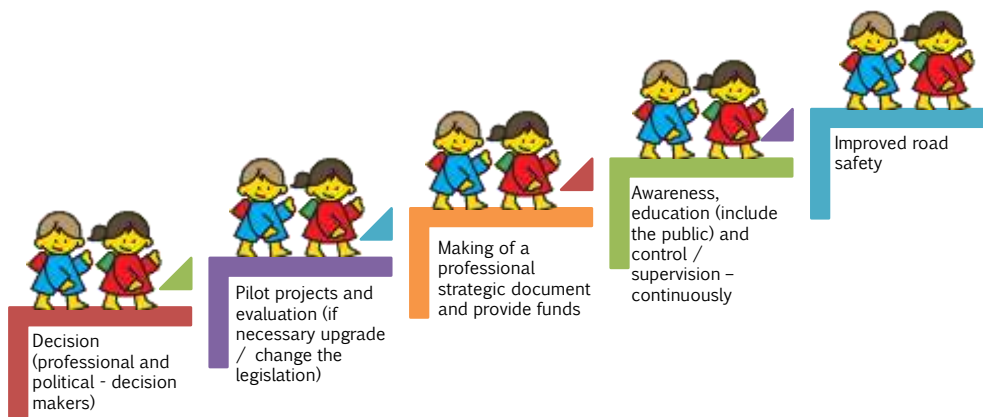


DRIVEN TO SCHOOL



WALKING TO SCHOOL

28



31

Thank you for your attention



<https://www.linkedin.com/company/varna-%C5%A1olska-pot-safe-way-to-school/>



<https://www.youtube.com/c/drsi-mzi>



https://twitter.com/Safer_to_School

32