Young Researchers Seminar 2013

Lyon, France , June 5-7 2013

Laboratoire d'Economie des Transports
Unité Mixte de Recherche du CNRS n° 5593
Université Lumière Lyon 2 - ENTPE

ICT and ITS applications for impoving safety of cyclists

Zbyněk SPERAT

CDV/ Transport research center

ECTRI
European Conference of Transport Research Institutes

DopSit

FERSI
Road Safety Research

Content

- introduction
- background
- objectives
- considered e-safety applications
- methodology
- results
- conclusion

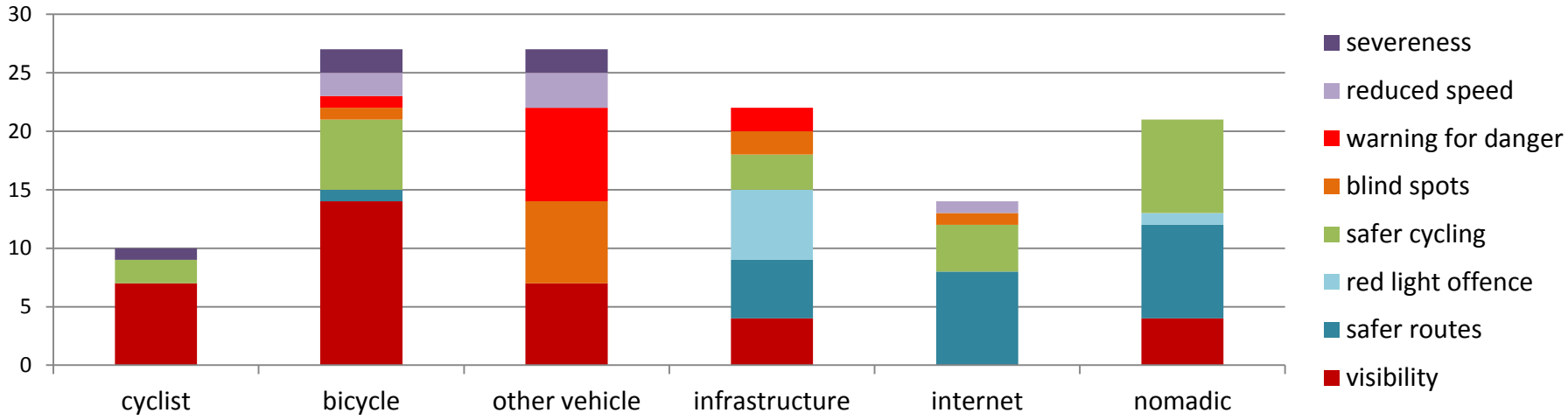
Introduction



- ICT/ITS and bicycle traffic
- SAFECYCLE project and its 3 main objectives:
  - identification of application
  - create knowledge and raise awareness about e-safety application
  - speed up adoption of (new) e-safety application in cycling

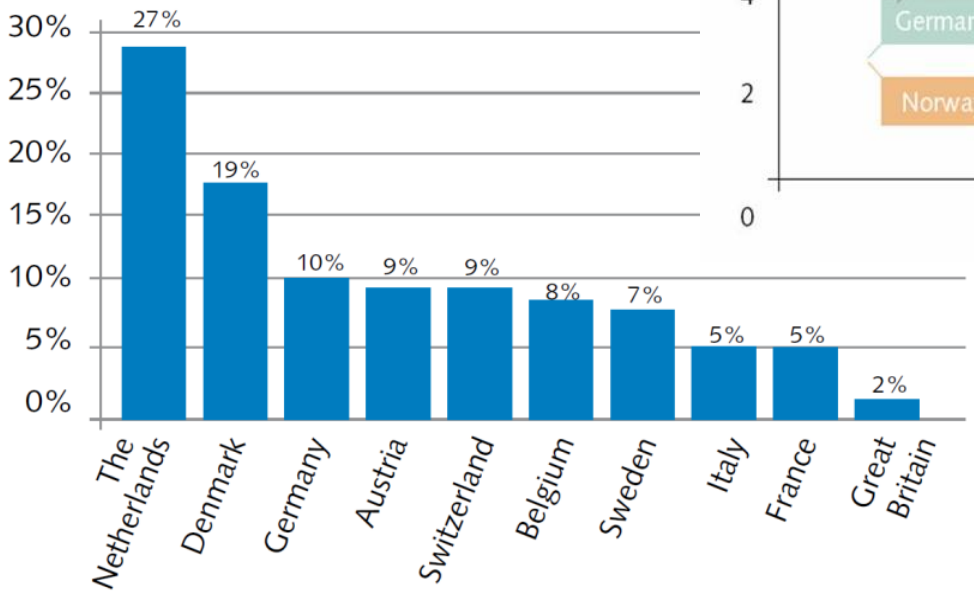
Introduction

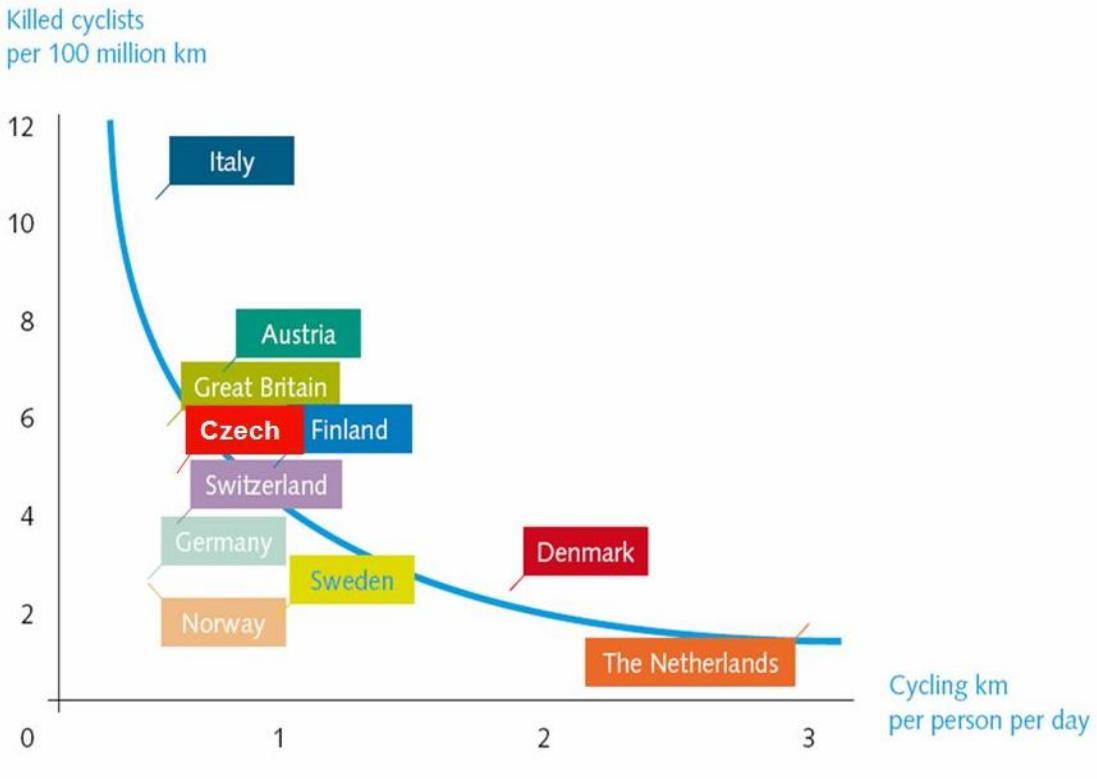
- SAFECYCLE project:
  - 121 application discovered
  - 30 for SWOT analysis
  - 11 for impact assessment



Background

Bicycle fatalities = 6.5% (2.600) of the total number of road accident fatalities in EU





Background

Facts to be considered:

- different bicycle share in the countries
- historical background and transport priorities in Eastern Europe
- cycling and road traffic in general is more danger in Eastern countries
- cyclists in Eastern Europe usually do not have the same priority as in Western Europe

Objectives

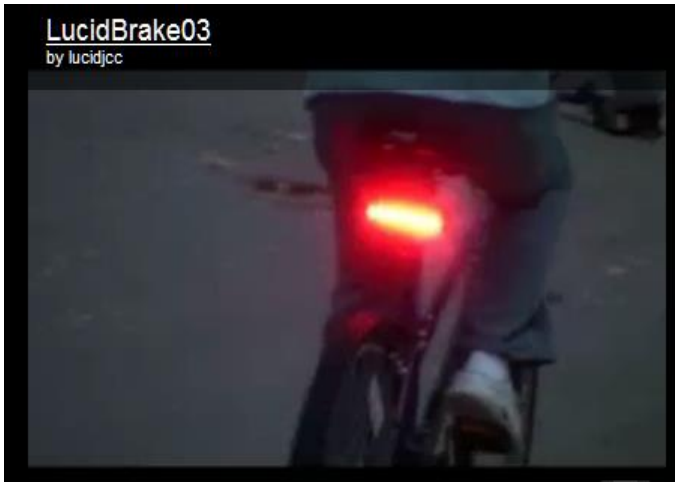
- the state of the art of eleven e-safety applications for cyclists and their expected benefits to improvement of cyclists safety in various European countries
- recommendations for future development, deployment and research for improving safety of cycling based on information collected

Considered e-safety applications



Lexguard
Existing

Detection strips on the truck to warn for objects around the truck combined with warning signs inside the truck.
Effect: prevention of blind spot accidents



Bicycle Braking Light
Existing

When cycling in a group, accidents happen because the cyclists at the back notice too late that the cyclists in front use their brakes. With the braking light, the cyclists at the back of the group are more likely to see the braking action in time.
Effect: increased visibility of the cyclist and lower chances on rear-end-collissions

Considered e-safety applications



LED-Mark
Existing

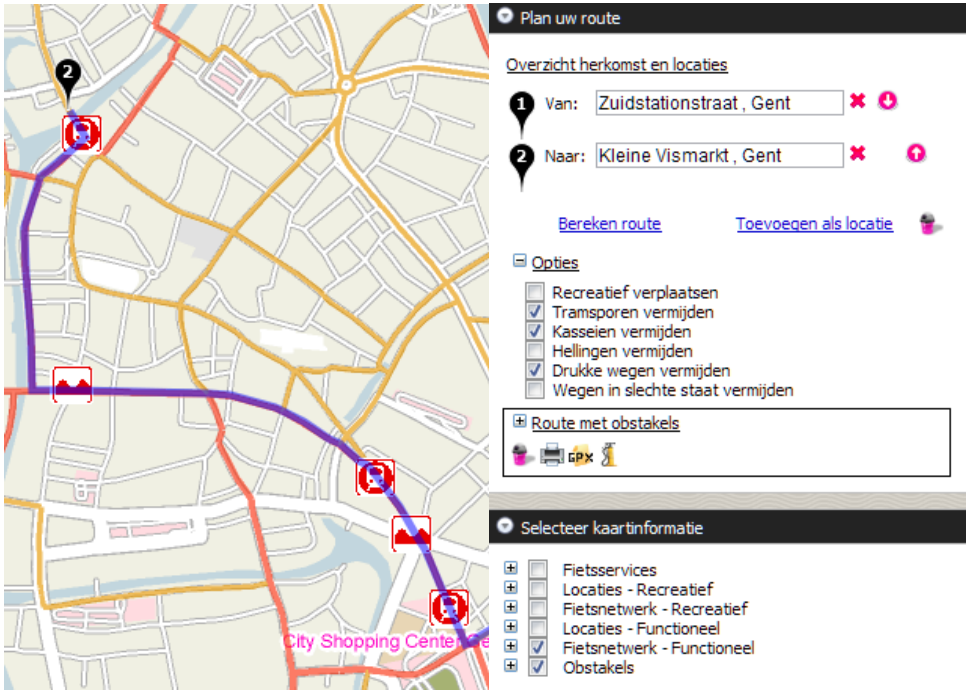
Energy efficient road marking which also can be used during frost. Works on solar cells and lithium polymer batteries .
Effect: increased visibility of cyclists



SaveCap - Airbag for cyclists
In development (TNO – APROSYS)

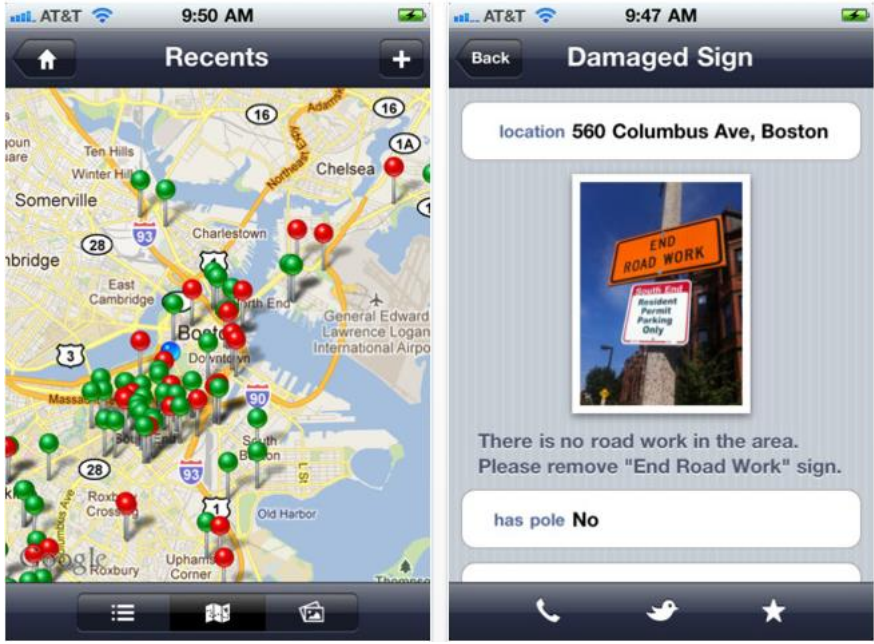
Airbag on the bonnet and windows protects the cyclist in case of an collision
Effect: reduced severeness of injuries in case of collission

Considered e-safety applications



Fietsrouteplanner Gent
Existing: Gent

Potentially dangerous situations for cyclists like tram tracks, cobble stones or very busy roads can be avoided by the route planner.
Effect: safer routes



Citizens Connect
Existing: Boston, USA

Citizens take active part in reporting dangerous situations, e.g. snow or ice. Reporting will be followed up by action.
Effect: less one-sided accidents

Considered e-safety applications

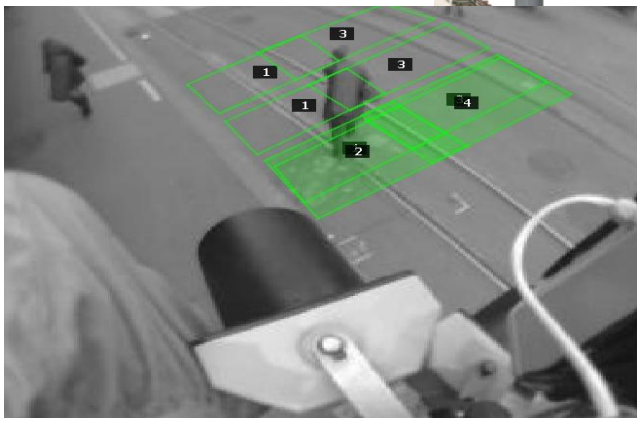


Individual Speed Adaptation
In development

V2V and V2I communication allows detection of bicycles and to anticipate on them by adapting speed or braking
Effect: prevention of collisions with cyclists







Traffic Eye Zürich
Realised in spring 2011

Bicycles get green before the public transport to increase the safety and comfort of the cyclist on the following 200 meters after the intersection. Extra green is only given when cyclists are detected to ensure optimal use of the intersection.
Effect: prevent conflicts between cyclists and trams after the intersection where the road is shared

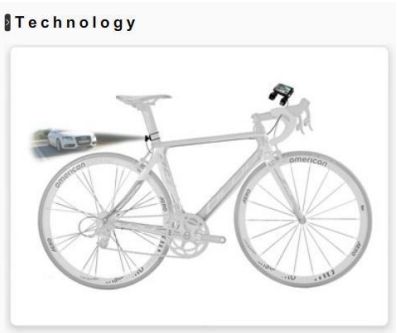
Considered e-safety applications



Light Lane Bike
Existing – patent has been applied for

Where a real bike lane is missing, a virtual bike lane is projected by the cyclist, thus creating his/her own virtual bike lane. It is expected that this will create more space around the cyclist when taken
over by a motorized vehicle
Effect: increased visibility of the cyclist and the safety space needed around





HindSight
Existing

A rear-view camera records movements around the bicycle and the images are shown on a display mounted on the handlebars. The cyclist knows what is going on behind him without having to make extra manoeuvres, which allows him to focus on the road ahead and avoid instability.
Effect: increased visibility of the cyclist and the safety space needed around

Considered e-safety applications



Countdown Traffic Light
Existing

LED Countdown Meter reminds drivers and pedestrians of the waiting time through counting down numbers to effectively reduce the rate of traffic accidents. In Groningen in The Netherland (second picture from the left), the traffic light detects arriving cyclist, than the countdown system starts.
Effect: increased safety bacause of less red light offences

Methodology

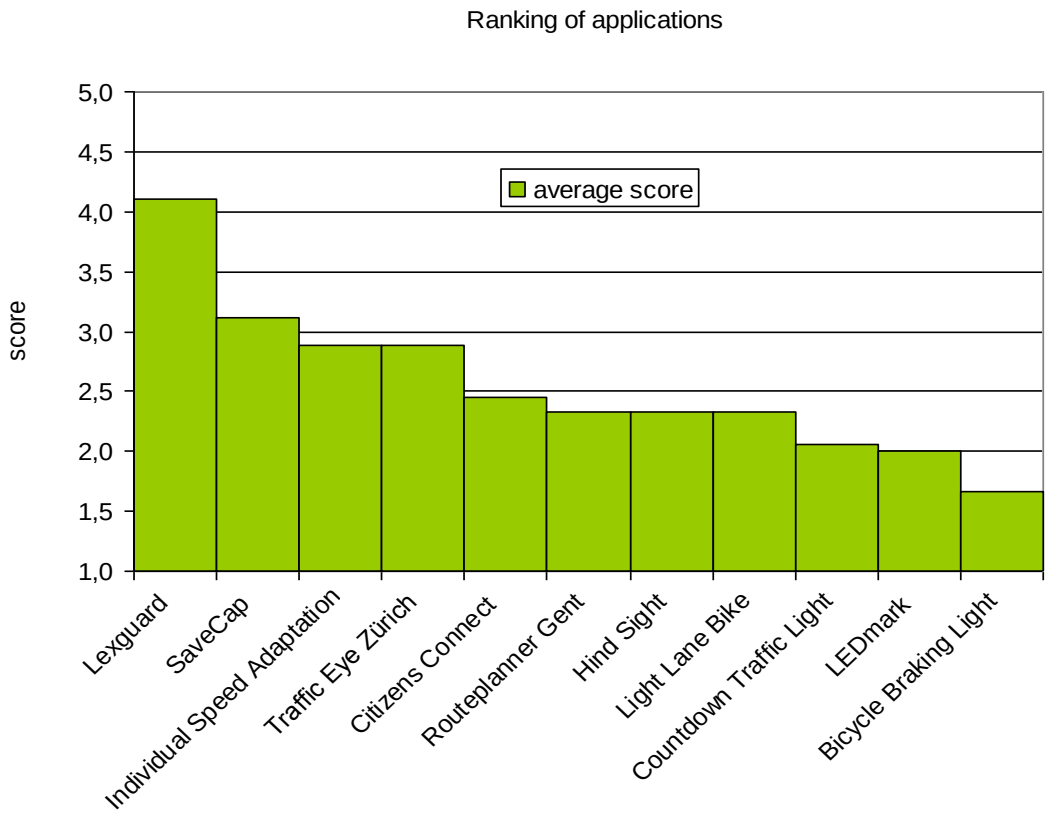
- participants – Ministries of 29 countries (EU + Norway and Switzerland)
- content of the survey

  To what degree can each from the eleven applications lower the risk or impact of traffic accident involving cyclists in each country - rating the applications (from 1 to 5 points) and comments
- conditions for deployment (legislative regulations, necessity of permission, approvals)
- recommendations for other application
- national research programmes

Results

29 requests sent,
11 answers returned

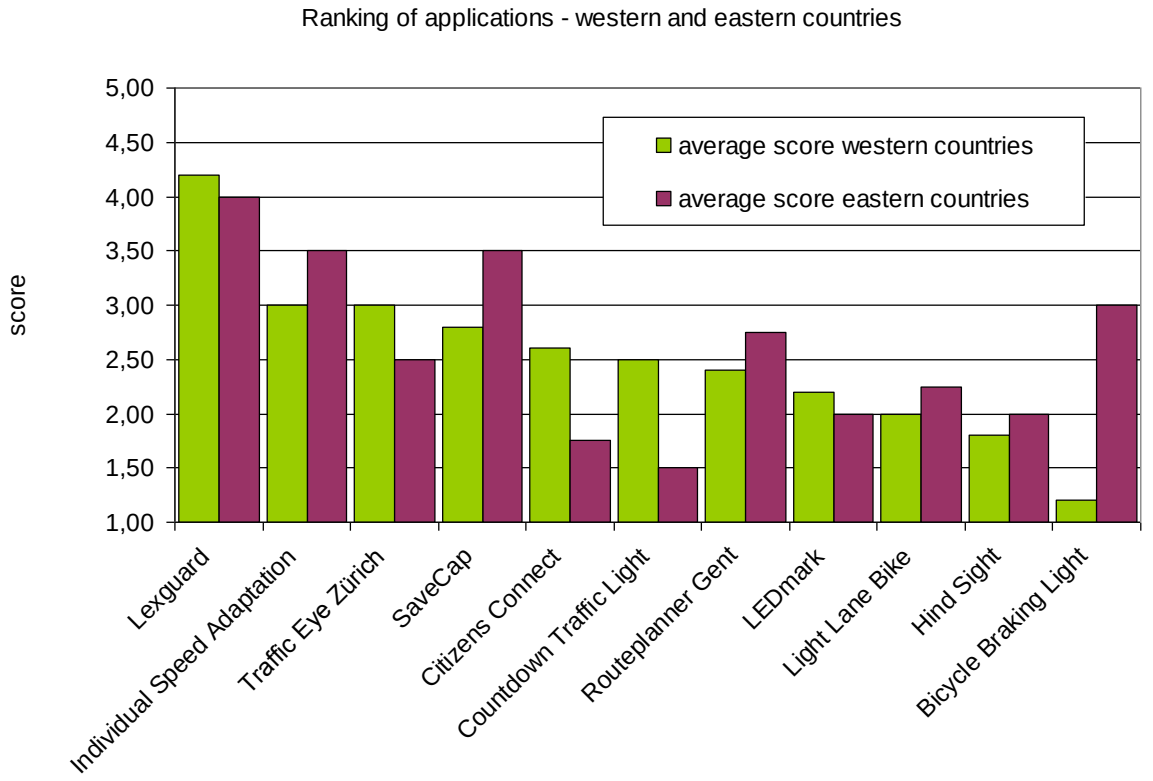
- Belgium – Flanders
- Czech Rep.
- Estonia
- Finland
- France
- Ireland
- Latvia
- Lithuania
- Norway
- Spain
- Sweden



Average ranking of applications

Results

Belgium – Flanders
Czech Rep.
Estonia
Finland
France
Ireland
Latvia
Lithuania
Norway
Spain
Sweden



Average ranking of applications – East vs. West Europe

Results

- necessity of permissions, approvals
- legislative regulation for usage of the applications

Spanish national legislation do not allow to have Bicycle Braking Light or Light Lane bike on bike. Light Lane Bike can not either be implemented in Finland as colour and use of bike symbol this way is against the Finnish legislation.

Conclusion

5 top rated applications

Lexguard

Peripheral detection on buses and trucks is required urgently. Legislative obligation could speed up the use of it, all new vehicles should be equipped with such a detection and warning application if deeper cost benefit analysis proves its rationalization.



Conclusion

SaveCap

Further research is needed to define types of accidents for which SaveCap provides a solution. Based on its results SaveCap can be made mandatory for all vehicles or could become part of the EuroNCAP system.



Conclusion

Individual Speed Adaptation

Impact analysis to drivers attention is needed. It is convenient to connect development of this application to development of navigation systems.



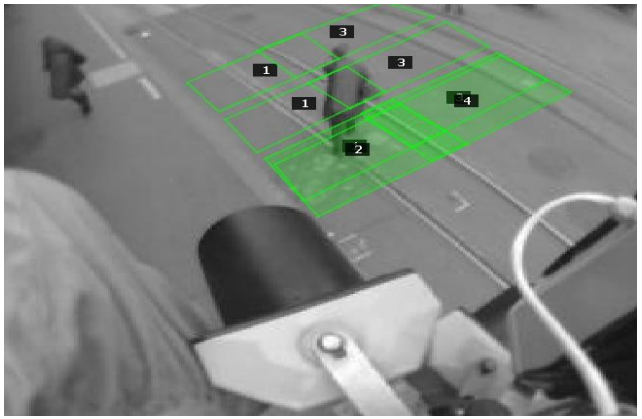
Conclusion

Traffic Eye Zürich

The traffic volume of both modes (PT+bike) is one of the key parameters when assessing the convenience of usage this application. More research is needed to determine the circumstances of usage and the impact on safety.



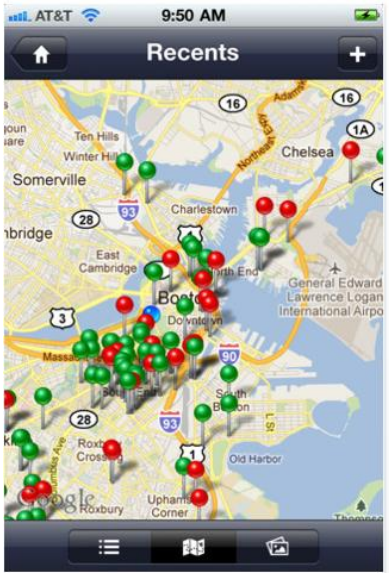




Conclusion

Citizens Connect

Application can be used for more purposes, not only for cyclists. Improving traffic safety is not the main purpose of the application. Citizens Connect can be interconnected to route planners or other application where integration of citizens and their contribution to coty monitioring is needed (out of transport sector).





Conclusion

Some apps score lower in Eastern Europe because they are not in practice there and good experiences from Western Europe are not known yet in the Eastern European countries (Countdown Traffic Light and Traffic Eye Zürich)

In Eastern Europe applications based on **warning** (driver or cyclists) score higher than in Western Europe, reversely in Western Europe applications providing **smart information** to cyclist are rated better.

Conclusion

In Eastern Europe - application which can contribute to **better visibility is rated quite high** even if there are obvious limits in use or side effect which can lower attention of the user. In this respect Bicycle Braking Light and Hind Sight are good cases. (factor of lack of cycling infrastructure?)

Conclusion

- lack of detailed accident data and evaluation the impact of the application
- more research is needed in the causes of bicycle accidents and impact of e-safety application to the cyclist
- impact of the application to other cyclists who are not equipped (Braking Light)

This work was part of the project DOPSIT Reg. No. CZ.1.07/2.3.00/20.0226 funded under the Operational Program Education for Competitiveness.

esf european social fund in the czech republic

EUROPEAN UNION

MINISTRY OF EDUCATION, YOUTH AND SPORTS

OP Education for Competitiveness 2007-13

INVESTMENTS IN EDUCATION DEVELOPMENT

DopSit

Thank you for your attention!

Zbyněk SPERAT
CDV, Transport Research Center
Czech Republic
zbynek.sperat@cdv.cz