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D5.1: Recommendations on standardisation, deployment and a research agenda

SAFECYCLE

The Intelligent Bicycle Initiative for safe cycling in Europe

Project Acronym: **SAFECYCLE**

Project Coordinator: **Mobycon (Netherlands)**

Proposal full title: **ICT applications for safe cycling**

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Summary: **Analysis of standardisation process, deployment of e-safety applications for cyclists and research programmes, resulting in recommendations for standardisation, deployment and a research agenda.**

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Executive summary

This report describes standardistation issue of ICT and ITS applications, gives information on deployment of applications for safer cycling in European countries, analyzes research in field of cycling, safety and ICT/ITS and gives recommendations into the future.

The standardisation process is described in the second chapter. The benefit of this process from the world and EU perspective is outlined and main bodies related to the SAFECYCLE project are named. This chapter describes also relation of 11 applications selected in previous parts of the project to the standardisation world. Main output of this chapter is the recommendation for:

- establishing a new working group on ITS for cyclists,
- standardisation of Traffic Eye Zürich application.

Chapter 3 compiles information from 11 European countries on:

- assessement of 11 selected application,
- recommendation on the other application for improving safety of cyclists,
- national research on safety of cyclists and ICT/ITS.

Differences between Eastern and Western Europe in mean of the purpose of the applications are identified. Analysis of the data from the ministries has shown that according to these ministries:

- Lexguard is the top rated and the most needed application.
- Indivudual Speed Adaptation has great space for development.
- Redarding different safety situation and possition of bicycle in transport system in European countries Eastern European countries prefer warning applications. On the other hand Western Europe prefers applications providing more information.

Research and financing is the topic of chapter 4. Overview of recent and running European and important national research projects shows that there are only two other research projects focusing on ICT or ITS contribution to safer cycling – NAVIKI and WATCH-OVER.

The final chapter concludes the situation of eleven selected application and e-safety and gives recommendations for future activities in areas of standardisation, deployment, research agenda and transport policies with the following outputs:

- Active communication between vehicles, bikes and infrastructure is the future of e-safety.
- Increasing knowledge amongst authorities about the benefits of e-safety applications for bicycles is needed.
- Cooperation between car industry, bicycle manufacturers and ITS companies is essential to speed up tho development of application.
- Evaluation of best practices with focus on transferability to other regions and other transportation circumstances must go hand in hand with their deployment.
- More research is needed in the causes of bicycle accidents.

List of Terms

Abbreviation	Definition
ITS	Intelligent Transport Systems, *see also chapter 2.1.1 for more detailed definition*
ICT	Information and Computer Technology, *see also chapter 2.1.1 for more detailed definition*
SWOT	Strength Weakness Opportunity Threat
WP	Work Package of the SAFECYCLE project

Note: Abbreviations related to standardisation issue are listed in chapter 2.1.1

1. Introduction

ICT can be used in cycling to provide intelligent systems that assist the cyclist to avoid, prevent, or mitigate accidents. Although some ICT/ITS applications and services have been developed for cycling, there is no integrated approach to research activities in this domain at a national or international level. To fill in this gap, the SAFECYCLE project was proposed in 2010 and accepted in 2011.

The main objectives of SAFECYCLE project are:

- to identify e-safety applications that have the potential to enhance the safety of cyclists in Europe;
- to create knowledge and raise awareness about e-safety applications applied to cycling (policy, industry, users);
- to speed up the adoption of (new) e-safety applications in cycling.

E-safety in SAFECYCLE project is defined as an intelligent safety system that could improve road safety in terms of exposure, crash avoidance, injury reduction and post-crash phases. A variety of measures are being promoted widely as 'e-safety' measures, though the knowledge about e-safety is slowly evolving, including information on the costs and benefits of measures (EC 2012), This is also what the project team found out while working on the impact assessment of the selected applications.

In Work Package (WP) 2 more than 120 applications for cyclists were found by the project team. Not all of the applications are in definition e-safety applications, but have the potential to increase safety in a smart manner. The search not only included Europe, but also other continents. At the end of WP2 the list of e-safety applications was reduced to 30 applications based on various criteria (for more information, see Deliverable 2.1 of SAFECYCLE). These applications were entered into WP3, the SWOT (strength, weakness, opportunity and threat) analysis. Cycling, ITS and road safety experts filled in many SWOTs, resulting in a list of applications from most to less promising in relation to increasing road safety for cyclists. The SAFECYCLE project team selected 11 applications out of the 30 applications based on the SWOT (for more information, see Deliverable 3.1 of SAFECYCLE).

In WP4 for each of the eleven applications an impact assessment on traffic safety for cyclists was carried out. Safety impacts are expected directly from increasing the safety for cyclists, for instance by increasing the visibility of cyclists, by preventing blind-spot accidents, by preventing red light negation or by planning safer cycling routes (for more information, see Deliverable 4.1 of SAFECYCLE).[1]

The first aim of this report is to describe the relation of applications selected in previous WPs to standardisation processes and recommend relevant standardisation bodies and necessary steps for standardisation of applications. This is the content of chapter 2. Standardisation.

[1] The deliverables of WP2, WP3 and WP4 can be found on http://www,safecycle,eu/section/deliverables

The second aim is to describe approach to SAFECYCLE topic in various European countries and analyse related research. Information form the ministries are analysed in chapter 3.

Research and financing is the subject of chapter 4. Last chapter 5 gives recommendations for future development, deployment a research for improving safety of cycling.

2. Standardisation

2.1 Introduction

The aim of this analysis is to describe the relation of applications selected in previous WPs to standardisation processes and recommend relevant standardisation bodies and necessary steps for standardisation of applications. For easier orientation in standardisation issue, definitions and abbreviations of basic terms are introduced.

2.1.1 Definitions and abbreviations

CEN - European Committee for Standardization - is a major provider of European Standards and technical specifications. CEN's 33 National Members work together to develop voluntary European Standards (ENs). These standards have a unique status since they also are national standards in each of its 33 Member countries. With one common standard in all these countries and every conflicting national standard withdrawn, a product can reach a far wider market with much lower development and testing costs. (http://www.cen.eu)

CENELEC - European Committee for Electrotechnical Standardization - responsible for standardization in the electrotechnical engineering field. Besides European Standards, CENELEC produces other reference documents, which can be developed quickly and easily: Technical Specifications, Technical Reports and Workshop Agreements. (http://www.cenelec.eu)

COLIBI – Association of the European Bicycle Industry (http://www.colibi.com/)

COLIPED - Association of the European Two-wheeler Parts' & Accessories' Industry (http://www.coliped.com)

ETSI - European Telecommunications Standards Institute - produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies. (http://www.etsi.org)

ETRA – European association for independent bicycle, moped and motorcycle retailers (http://www.etra-eu.com)

Harmonisation of standards (EU level) - A harmonised standard is a European standard elaborated on the basis of a request from the European Commission to a recognised European Standards Organisation to develop a European standard that provides solutions for compliance with a legal provision. Such a request provides guidelines which requested standards must respect to meet the essential requirements or other provisions of relevant European Union harmonisation legislation (http://ec.europa.eu)

ICT - Information and communications technology - unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary software (wikipedia)

ISO - International Organization for Standardization - developer of voluntary International Standards. International Standards give state of the art specifications for products, services and good practice, helping to make industry more efficient and effective. Developed through global consensus, they help to break down barriers to international trade. (http://www.iso.org)

ITS - Intelligent transport systems (applications) - are advanced applications which, without embodying intelligence as such, aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks. Although ITS may refer to all modes of transport, EU Directive 2010/40/EU of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport defines ITS as systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport (wikipedia)

Standard - A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose. (http://www.iso.org)

Standardisation - is the process of developing and implementing technical standards. The goals of standardization can be to help with independence of single suppliers (commoditization), compatibility, interoperability, safety, repeatability, or quality. (wikipedia)

TC - Technical committee – ISO definition: Group of experts from all over the world developing ISO standards. These experts negotiate all aspects of the standard, including its scope, key definitions and content. (http://www.iso.org)

TC - Technical committee – CEN definition: Technical decision making body with precise title, scope and work programme, established in the CEN System by the Technical Board (BT), essentially to manage the preparation of CEN deliverables - in accordance with an agreed business plan. (http://www.cen.eu)

TR - Technical Report - is an informative document that provides information on the technical content of standardisation work. It may be prepared when it is considered urgent or advisable to provide additional information to the CEN national members, the European Commission, the EFTA Secretariat (The European Free Trade Association), other governmental agencies or outside bodies. (http://www.cen.eu)

TS - Technical specification - is a normative document, the development of which can be envisaged when various alternatives that would not gather enough as to allow agreement on a European Standard (EN), need to coexist in anticipation of future harmonisation, or for providing specifications in experimental circumstances and/or evolving technologies. (http://www.cen.eu)

WG – Working group – CEN definition: Group, established by a Technical Committee (TC) that undertakes a specific task, in the context of the TC business plan, usually resulting in the provision of (a) draft standard(s). It works within clearly defined policy guidelines from its parent body. On completion of its task, the Working Group (WG) is disbanded. (http://www.cen.eu)

2.1.2 Process of standardisation in SAFECYCLE project

European Standards (ENs) are based on a consensus, which reflects the economic and social interests of 33 CEN Member countries channelled through their National Standardization Bodies (NNOs). Most standards are initiated by industry. Other standardization projects can come from consumers, Small and Medium-sized Enterprises or associations, or even European legislators. CEN works in a decentralized way. Its members – the National Standardization Bodies of the EU and EFTA countries – operate the technical groups that draw up the standards; the CEN-CENELEC Management Centre in Brussels manages and coordinates this system.
Regarding SAFECYCLE project and facts mentioned above, the interface, data format or communication frequency are the parameters of technical solution to be standardised, not whole applications. Open interface for all kinds of devices is the core.
In this respect the outputs of SAFECYCLE project should recommend next steps for existing technical committees or working groups to prepare conditions for easy and fast deployment of selected application. Results of SAFECYCLE project should be also proper basis for creating new working group for ITS and cycling.

2.2 Standardization – the way forward

2.2.1 The role of standardization

Standardization is a corner stone of future development of pan-European applications that can spread good practice around Europe. Harmonized requirements on systems, devices and applications can built healthy competition and open up the market. The meaning of standardization is to stabilize and generalize possible “industrial” innovations to that extent they can be used widely and can be interconnected, built-on and integrated in existing state-of-art. Standardization is a logical step after an innovation has been achieved, that is why standardization is closely connected to research results. Its meaning is to set up requirements that can be perceived as generally acceptable and can be also used in relevant (adjacent) domains.

For the purposes of SAFECYCLE project there might be requirements that have already been standardized for other purposes as in-vehicle systems (IVS), road equipment etc. The analysis is to suggest the most suitable way of standardization, present the relevant technical committees (TC) and working groups (WG) that develop and approve technical standards for relevant domains.

2.2.2 European standards development

In Europe there are three European SDOs (standards developing organizations) – CEN for general European standards, CENELEC for electric and electro-technical standards and ETSI for telecommunication standards.

Some of the issues are not solved on European level but on international level. International standards organization ISO is an equivalent for CEN; IEC for CENELEC. It is a general fact that many of ISO standards are developed with European contributions and after their

approval they are transposed as European standards (EN, obligatory for CEN members), technical specification (TS, non obligatory) and technical reports (TR, informative).

The standard process of a standard development, procedure of an ISO standard, is illustrated in Figure 1, see Annex A.

2.2.3 Transport domain

Systems, applications and devices for transportation are standardized in the technical committees of CEN and ISO; their electrical properties in CENELEC/IEC and their telecommunication properties in ETSI. Apart from CENELEC and ETSI the most important requirements are standardized in CEN, as CEN is focused on “application level” of systems and devices. For the domain of transport there are several relevant technical committees. On one side there is a domain of roadside equipment – products serving for traffic guidance, on the other side there are systems and devices that bring some intelligence into transport – intelligent transport systems. The list of relevant technical committees is specified as follows:

- CEN/TC 226 Road equipment
- CEN/TC 278 Road traffic and transport telematics (RTTT)
- ISO/TC 204 Intelligent transport systems (ITS)
- ETSI TC ITS

And for the domain of cycling

- CEN/TC 333 Cycles
- ISO/TC 149/SC 1

CEN/TC 226 Road equipment

For road equipment the committee CEN/TC 226 Road equipment has been established. European standardization is done by the preparation of European standards in the following fields:

a) safety fences and barriers, including guard rails, safety fences, crash barriers, crash absorbers and bridge parapets;
b) horizontal signs including road studs and road markings;
c) vertical signs including signs, cones and marker posts;
d) traffic lights including signals, traffic control and danger lamps;
e) street lighting, performance requirements only;
f) other equipment including bollards, anti-glare screens and noise protection devices.

The road equipment aims to contribute to the safety, to the improvement, and to the comfort of the movements of the users.

The road equipment are subjected in the majority of the European country, subject to a regulation being binding to all the owners building, improving and maintaining roads open to public circulation because of the requirements of safety of who characterize these devices and the need of road users for a homogeneous application on all the networks of roadway systems (motorways, trunk roads, secondary roads, communal ways) which results from this.

The further information about the structure and personal involvement is specified in Annex B.

CEN/TC 278 Road traffic and transport telematics (RTTT)

Intelligent transport systems are standardized on European level in CEN/TC 278, on international level in ISO/TC 204. The cycling domain can share some requirements with several working groups; specifically this is defined in the assessment of the selected applications, further below. The profiles of both committees are specified in the annexes C and D.

Standardization of cycling – the issue for CEN/TC 278 or ISO/TC 204

The committees standardize the issues of digital maps, in-vehicle systems, message exchange, public transport, etc. There is a potential of integration of cycling requirements into ITS. This can be done in two ways:

- apply the requirements of relevant existing standard (mainly in the case of applications based on the equipment of infrastructure or vehicle;
- invoke a possible foundation of new working group within CEN/TC 278 to start new preliminary items on applications for cycling that are about a smart system within a bicycle not physical properties of bicycle.

The right procedure is proposed within the assessment of the selected application below. The author of the assessment was the official representative of the Czech Republic in CEN/TC 278, attending regularly their meetings in past seven years so there might be further guidance on how to proceed to the real standardization.

ETSI TC ITS

ETSI standardizes the communication issues. In the world of ITS there has been made an agreement between CEN and ETSI that CEN standardizes the application level of the communication (levels 5-7 of OSI model) and ETSI standardizes the physical and network communication protocol layers (levels 1-4 of OSI model). For device manufacturers, e.g., both ETSI and CEN standards are relevant. For the purposes of the project Safecycle CEN standards could be of relevance only.

CEN/TC 333 Cycles

This committee standardizes mostly the physical properties of bicycles. So the safety issues are connected with proper functioning of the bicycle as a product, not a smart system. See also Annex C.

ISO/TC 149/SC 1 Cycles and major sub-assemblies

The following subcommittees have been identified (see also Annex D):

- TC 149/SC 1/WG 9 Revision ISO 4210 and ISO 8098 (safety requirements)

- TC 149/SC 1/WG 10 Lighting and retro-reflective devices – *this one could be of relevance to the braking light application and the light lane bicycle*
- TC 149/SC 1/WG 11 Luggage carriers – irrelevant
- TC 149/SC 1/WG 12 Audible warning devices – *this one could be of relevance to ITS technologies for cyclists (it should be proved whether the audible devices are to warn cyclists (user of the device) about a possible danger or e.g. pedestrians to move aside.*

The standards in preparation

- ISO/AWI 14878 http://www.iso.org/iso/rss.xml?csnumber=55230&rss=detail Cycles – Audio warning devices – Technical specification and test methods

This item is in very start (AWI) so there is hardly any draft of the standard. It would be advisable to monitor the development of the item whether these are devices to warn other people or to warn the cyclist. It would also be beneficial, even if this is just to warn the others, to follow the development, as there might be requirements that could be of use for ICT solutions with audio warning.

2.3 Evaluation of selected applications for safe cycling regarding potential standardization

2.3.1 Introduction to applications for safe cycling

The report analyses several safety application for cycling. Some of them are based on existing road infrastructure improvement (e.g. physical or optical characteristics), some are based on “intelligent” solution using ICT technologies. As the worldwide trend is heading to intelligent urban infrastructure based on **machine-to-machine communication**, the solutions based on ICT are those having the long-term impact on users and potential for greater integration with others. On the other hand the process of establishing such applications need much more time and investments but at the end it pays off.

The domain of intelligent transport systems (ITS) is very dynamic, for illustration since 2007 there were 195 items in total and 2012 we might follow almost 370 working items, i.e. there are 35-40 new working items every year registered in relevant CEN and ISO committees (CEN/TC 278 and ISO/TC 204). For safe cycling it means that there could be several requirements on similar or adjacent systems (e.g. in vehicle systems detecting obstacles, i.e. also cyclists) already defined and standardized. So the way of standardizing some of the perspective applications is a logical step in safe cycling domain development and the key step for raising awareness in other European cities. All the applications are subject of an evaluation and possible steps are proposed, further below.

The trend in ITS is heading to so called **cooperative systems** – the communication V2V (vehicle-to-vehicle) and I2V (infrastructure-to-vehicle). This concept is based on machine-to-machine interactions with translations of collected data from various systems into one piece of information (e.g. warning) to human user (driver). As there is to be very much information the driver is to be protected by semi automatic or full automatic systems reacting on the

actual traffic situations (e.g. automatic braking system when detecting the obstacle in front of the vehicle). The concept of cooperative systems relies on equipping of e.g. urban infrastructure with communication devices and interconnecting them to create a network (smart grid). Considering this the way forward for safe cycle applications leads to sustainable equipping of bikes with communication modules and infrastructure as well. The infrastructure and possibly vehicle equipment and applications are in majority defined by ISO/TC 204 and CEN/TC 278 standards. But there are many others, at the side of a bike, to be defined.

The ultimate aim of people handling with or delivering “smart cyclist applications” should be the standardization of generally acceptable concepts to further promote the standardized technological solutions to public authorities when preparing a tender for any ITS system in urban areas. The existence of the requirements on “ITS cycling” brings input requirements to other systems, for illustration smart OBU (on board unit) to detect cyclists, and can possibly realize the integration of the concepts in other more complex concepts, as cooperative systems are. This is the way towards one pan European smart network (e.g. where a OBU supplier from Spain delivers an OBU that can communicate with a bike equipment from Finnish supplier installed on a bike in Amsterdam).

2.3.2 Evaluation of applications

This chapter focuses on eleven applications selected in previous parts of the SAFECYCLE project[2]. The same applications analysed in this report were assessed by impact assessment described in deliverable 4. The applications are divided into four categories, according to their main objective:

1. Bicycles
2. Other vehicles
3. Infrastructure
4. Web applications (internet and nomadic devices)

For the category ‘cyclist’ no application was selected as a result of the SWOT analysis. The table below gives an overview and short description of the applications:

Category	Application	Description
Bicycles	Light Lane Bike	A green laser projects a cycle lane behind the bicycle, which increases the visibility of the cyclist and makes it easier for other road users (car drivers) to react appropriately to the cyclist’s presence.
	Hind Sight	A rear camera records the movements around the bicycle and the images are shown on a display on the handlebars. The cyclist knows what is going on behind the bicycle without having to make extra manoeuvres. This allows the cyclist to focus on the road ahead and to avoid instability.

[2] For more information about selected applications, take a look at the deliverables 2, 3 and 4 on the SAFECYCLE website

Category	Application	Description
	Bicycle Braking Light	The rear light of the bicycle becomes brighter when the cyclist starts to brake.
Other vehicle	Lexguard	Detection strips on the truck detect objects around the truck and trigger warning signs inside the truck.
	Individual Speed Adaptation	By adapting the speed of individual cars, based on their position on the road network and specific characteristics of the vehicle, safety of specific road user groups can be increased.
	SaveCap	Decrease of severity of injuries of cyclists in case of a collision with a car bonnet.
Infrastructure	LEDmark	Increased visibility of cycle infrastructure by LEDs integrated in the cycle lane.
	Traffic Eye Zürich	To prevent conflicts between trams, buses and other traffic at intersections, bicycles get green before the public transport to increase the safety and comfort of the cyclist. Extra green is only given when cyclists are detected to ensure optimal use of the intersection.
	Countdown Traffic Light	Traffic light gives information about the expected waiting time during red light.
Web apps	Citizens Connect	App for nomadic devices aimed at involving citizens in keeping the public environment liveable and safe.
	Routeplanner Gent	Route planner enabling cyclists to plan a safe route, avoiding (perceived) dangerous situations for cyclists.

Table 2.1. Overview of applications analysed in deliverable D5

The text below is to present all the selected safety applications for cycling with the assessment of the potential of wider use and even standardization.

Light Lane Bicycle Lane

The application is based on the functionality of the system on bicycle without any communication to other objects on the road. Thus, the system is isolated and as such it is not standardized at all. Regarding ITS the system should have some interaction with the environment otherwise it has no value for ITS; it is valuable just for the visibility of the object within a traffic flow.

Conclusion:

There is no need to standardize the system regarding the world of ITS. The system has no value for future cooperative systems and the preferable solution for cyclist presence

detection (awareness) is through vehicle sensors´ detection or special communication equipment installed on the bicycle.

Anyway the system has the value for cyclist safety and as such can be standardized through appropriate WG - ISO/TC 149/SC 1.

Car airbag for cyclists (SaveCap)

The application is based on the safety functionality of a vehicle. As the penetration rate (purchase) of new vehicles is very low the application´s potential is definitely long-term one. It is based on diminishing the impacts of an accident on a cyclist involved, not any prevention. ITS systems are based on detection of potential dangers on the road so they are preventive provisions.

Conclusion:

There is no need to standardize the system regarding the world of ITS. The system has no value for future cooperative systems and the preferable solution for cyclist presence detection (awareness) is through vehicle sensors´ detection or special communication equipment installed on the bicycle.

LED-mark

The application is based on enhancing the road marking visibility through LED light road studs (the name of the application should be changed accordingly, see the definition in EN 1461-1.). LED road studs should respect the requirements of the standard for road studs – EN 1461-1. There is a special ITS application for consecutive triggering of LED road studs as the car approaches but it has not been standardized yet.

Conclusion:

This application has the potential to be a part of planned intelligent transport systems, so the potential of the installation is very high. The standardization should be recommended to relevant working group – CEN/TC 226 Road equipment, WG 2 Road marking.

HindSight

The application uses similar technique as used for car use, e.g. parking. The application can be standardized as an ITS system for cyclist. There might be easier applications with more potential as a direct communication cycle-vehicle with the potential to warn audibly the cyclist that the car is approaching e.g. from behind.

Conclusion:

This application has the potential to be a part of planned intelligent transport systems but its suitability and safety should be tested and some guidance on how to install (at what place) should be stated as a good HMI practice. The potential to standardize the system can be found but it is necessary to recommend the empowered CEN/TC 278 RTTT (Road transport and traffic telematics) to found a new working group on cyclist telematics.

Bicycle Braking Light

The application uses similar technique as used for car use. It is not an intelligent application and it does not have to be standardized. The requirements can be defined in a standard made by ISO/TC 22 Road vehicles (could be ISO/TR 13487:1997 or ISO 21069 or another braking system standard).

Conclusion:

There is no need to standardize the system regarding the world of ITS. The system has no value for future cooperative systems and the preferable solution for cyclist presence detection (awareness) is through vehicle sensors´ detection or special communication equipment installed on the bicycle.

Countdown Traffic Light

The application uses a telematics system; it detects the presence of a cyclist and the traffic light controller provides an additional functionality. There is no standard on that and the recommendation should be delivered to the relevant working group – CEN/TC 226 Road equipment, WG 4 Traffic control. The application should also respect the requirements of ISO 26684.

Conclusion:

This application has the potential to be a part of planned intelligent transport systems, so the potential of the installation is very high. The standardization should be recommended to relevant working group – CEN/TC 226 Road equipment, WG 4 Traffic control.

LEXGUARD

The application is an in-vehicle system warning the truck driver about the presence of a cyclist detected by installed detectors. The application is well defined as an in-vehicle system (for trucks) and thus must respect the requirement for such systems. These are defined by standards made within ISO/TC 204 Intelligent transport systems, WG 14 Vehicle/roadway warning and control systems (almost all, especially ISO TS 15624 and ISO 17387).

Conclusion:

The application should respect the already-standardized requirements for obstacles detection by vehicle´s sensors. The potential of the application is very high, but the penetration is a long-term issue.

Traffic Eye Zürich

The application is an ITS application giving preference to cyclist by tram and bus at the crossroads and use the same road lane as trams. It depends on public transport vehicles´ equipment, which is expensive, and the penetration is low (long term issue). As it is an on board equipment of public transport vehicles the standardization is the issue of CEN/TC 278,

working group WG 3 Public transport. If the application is well documented it can be proposed to WG 3 to start a new preliminary working item. Before this the results of EBSF (European Bus System of the Future) project should be compared with technical documentation of the system, especially the issue of on board equipment requirements (hardware and communication).

Conclusion:

The application is very interesting for standardization but it should take into account the actual results of European standardization and preparation of new standards based on the results of EBSF project (especially NeTex standards). As it is an issue of preference on the crossroads there might be a relevant input from ISO 22951. This item has a big potential to become a standard.

Intelligent Speed Adaptation

The application is a type of warning in-vehicle systems that are standardized by ISO/TC 204/WG 14. It has already been standardized in ISO 22179 (speed adaptation) or ISO 22839 (forward accident mitigation).

Conclusion:

The application should take into the already standardized in-vehicle system with the possibility to merge/use the functionality already implemented in on-board equipment (in-vehicle system (IVS)).

Citizens Connect

The application is one of the progressive city applications for citizens´ quality of life. It is a good example how to collect the data about problems in a city, not the points of interest. It provides cyclist the possibility to report problems on cyclist paths or city roads. The mobile devices apps are not standardized as their requirements are bound with a relevant application software platform (Android, Apple, Windows mobile…). ISO/TC 204/WG 17 deals with the standardization of nomadic devices for using ITS; it basically points on the interface between mobile or nomadic device and in-vehicle system. But there could be a potential to standardize the application mainly on the application level.

Conclusion:

If well documented the application could be the one to be standardized as an ITS application within ISO/TC 204/WG 17. The application is American (City of Boston) so it respects other standards than those common in Europe; the API is made according to Open311 specification. The application is provider specific and there is no intention to share it for standardization purposes.

RouteplannerGent

The application has a very good potential to be introduced into life in every bigger city. The base for a good journey planner is in mapping the potential mobility among the identified

places within a city (mapping means to provide data about all the travel possibilities between two places). These places should be identified in a unique way according to the European standard IFOPT (Identification of fixed objects in public transport, EN 28701); it means that every place is identified according to its significance, properties and relations to other objects in public transport (e.g. if it is accessible to handicapped people, if a cyclist can park his/her bike etc.). This digitalization provides basic but homogenous data about the infrastructure and can be complemented by the data from Citizens Connect and Routeplanner Gent applications. This is the way to integrate the efforts to reach intelligent city infrastructure.

Conclusion:

The application has the great potential to be standardized but it should respect many already defined standards from public transport area (CEN/TC 278/WG 3), data provision formats (CEN/TC 278/WG 4 a WG 8) etc. to raise the chance to be integrated in existing or future ITS systems and applications.

2.4 Conclusion

The SAFECYCLE project definitely opens up the issue to establish a new working group on ITS for cyclists. There are several issues as potential new working items on one hand and on the other there is potential to give some corrections to some of the applications regarding the trend in cooperative systems and potential of the systems for cyclist detection and safety. To issue an official letter with the results of the project to CEN/TC 278 and ISO/TC 204 secretariat to gain the official response about the possibility of standardization and establishing a new WG seems to be proper first step.

Traffic Eye Zürich has a big potential to become a standardized solution and even in a specifically established WG for ITS cycling. In the light of ITS systems the effort for cyclist safety progress should be headed to communication module equipment for future intelligent network. Such a concept could provide further more standardised solutions for bike protection, cyclist protection, cyclist preference, cyclist identification when parking the bike into special bike parking etc. Such applications would promote cycling significantly and in a safe manner.

Further research results on a possible future concept of active communication bike-to-car and bike-to-infrastructure has to be included in the concept of cooperative systems that is already standardized (CEN/TC 278/WG 16 and ISO/TC 204/WG 18)

3. Official information from European countries

3.1. Process of getting data

The aim of this part of WP5 was to get evaluation of eleven applications described in chapter 2.3.2, national research and recommendations for deployment e-safety applications from official institutions of European countries. National offices for standards were thought to be the right source of the data but regarding the findings that these bodies are not able to present transport data, appropriate Ministries were chosen as the complex source of information and official opinion of the country. Ministries were contacted through mailroom by an official request with the purpose to get the following data:

- 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
- List of applications:
  - Lexguard
  - Bicycle Braking Light
  - LEDmark
  - SaveCap
  - Routeplanner Gent
  - Citizens Connect
  - Individual Speed Adaptation
  - Traffic Eye Zürich
  - Countdown Traffic Light
  - Hind Sight
  - Light Lane Bike
- Identification of the possibilities and conditions of deployment of each application in each country (legislative regulations for using some applications, necessity of permissions, approvals).
- Recommendations of other application(s), which could decrease the risk or impact of accidents involving cyclists.
- Description of national research programmes focused on ITS related to bicycle traffic.

Countries selection

The suggested goal of this part of the project was to get the information as mentioned above from as many countries as possible. Finally 29 countries were selected and appropriate ministries, which are most relevant for the project (see Table 3.1).

EU countries		
1	Austria	Federal Ministry for Transport, Innovation and Technology
2	Belgium	Federal Ministry for Transport, Flemisch Region: ministry of Mobility
3	Bulgaria	Ministry of Transport, Information technology and Communications
4	Cyprus	Ministry of Communications and Works
5	Czech Republic	Ministry of Transport
6	Denmark	Ministry of Transport
7	Estonia	Ministry of Economic Affairs and Communications
8	Finland	Ministry of Transport and Communications
9	France	Ministry of Ecology, Sustainable Development and Energy
10	Germany	Federal Ministry of Transport, Building and Urban Development
11	Greece	Ministry of Infrastructure, Transport and Networks
12	Hungary	Ministry of Transport, Communications and Energy
13	Ireland	Department of Transport, Tourism and Sport
14	Italy	Ministry of Infrastructures and Transports
15	Latvia	Ministry of Transport
16	Lithuania	Ministry of Transport and Communication
17	Luxembourg	Ministry of Sustainable Development and Infrastructure
18	Malta	Ministry for Infrastructure, Transport & Communications
19	Netherlands	Ministry of Infrastructure and the Environment
20	Poland	Ministry of Transport, Construction and Maritime Economy
21	Portugal	Ministry for Agriculture, Sea, Environment and Spatial Planning
22	Romania	Ministry of Public Works, Transport and Housing
23	Slovakia	Ministry of Transport, Construction and Regional Development
24	Slovenia	Ministry of Infrastructure and Spatial Planning
25	Spain	Ministry of Development
26	Sweden	Ministry of Enterprise, Energy and Communications
27	United Kingdom	Department for Transport
Non EU countries		
28	Norway	Ministry of Transport and Communications
29	Switzerland	Federal Department of the Environment, Transport, Energy and Communications

Table 3.1. Countries and ministries requested for information and opinion on e-safety

Responses

In total 11 answers to requests for information were received from the countries with different level of completeness of the answers. The overview is shown in the table 3.2.

No	Country	Rating of 11 applications	Comments on rating	Possibilities of deployment of 11 application	Another type of application recommended	Info on research
1	Belgium - Flanders	yes	yes	yes	yes	yes
2	Czech rep.	yes	yes	yes	yes	yes
3	Estonia	yes	yes	yes	yes	yes
4	Finland	yes	yes	yes	no	yes
5	France	no	no	no	no	no
6	Ireland	yes	yes	no	no	no
7	Latvia	yes	yes	yes	yes	yes
8	Lithuania	yes	yes	yes	no	yes
9	Norway	no	no	yes	no	no
10	Spain	yes	yes	yes	yes	yes
11	Sweden	yes	yes	yes	yes	yes

Table 3.2. Completeness of the answers from the ministries

3.2. Data evaluation

For better understanding the feedback from Ministries a short introduction is given to describe the background of responses and show that traffic safety and modal share of bicycle are aspects necessary to consider while evaluating the data.

The figure below shows modal split of bicycle in Western European countries. Relevant data for Eastern Europe are not availabe except for Czech Republic with 3%. Other Eastern countries may have similar bicycle share; Hungary and Baltic countries are more cycle friendly than the others.

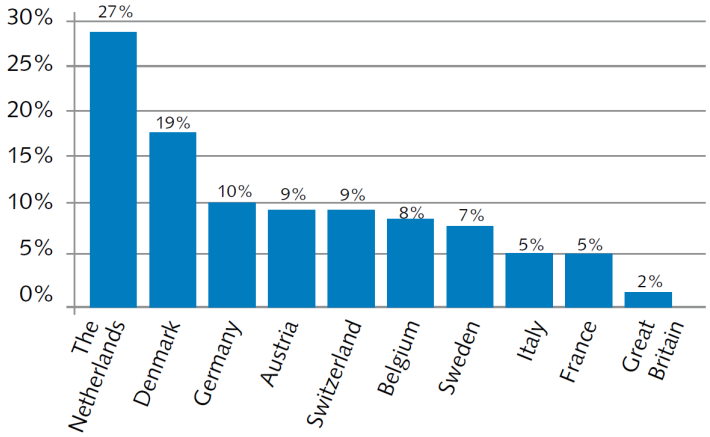

Figure 3.1. Bicycle sharre in some European countries.

Considering the fact that the biggest volume of cycle traffic is concentrated within the cities, the bicycle share as the national average number does not explain much. The modal share of the cities varies a lot in all countries. Even in Great Britain are true cycling cities like Oxford and Cambridge nearing 20%. But direct relationship between general conditions for cycling and ´national´ modal bicycle share can be considered. F.e. the better legislative conditions or more attention to cyclists, the higher modal share.

In Eastern countries the priorities of transport modes differs in comparison to the Western European countries and cyclists do not have as strong position as they should have. Since 1990s cyclist have not been considered to be an obstacle in traffic flow yet. The situation is getting better but the process of getting equal position among other traffic modes is very slow.

Safety of cyclists relates to the position of bicycle traffic too. Statistics show indirect relation between the number of fatalities and kilometers cycled (see figure 3.2). In the light of this relationship the total number of fatalities per number of inhabitants does not say much about safety of cycling in the country. Despite of the fact that the Netherlands has the third highest number of cyclists victims in EU, related to kilometers cycled it is the safest country.[3]

[3] For more data about traffic accidents have a look at the deliverable 4 (www.safecycle.eu)

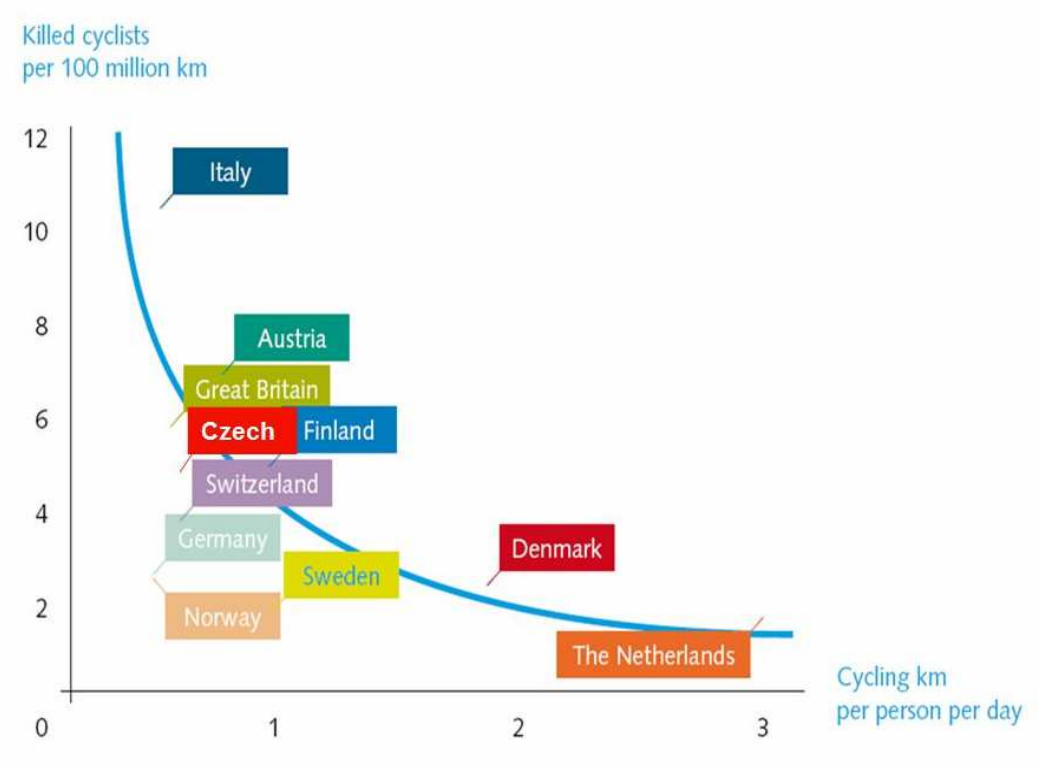

Figure 3.2. Relation between accidents and bicycle usage.

To conclude this paragraph evaluation described below has to be related to these facts:

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

For better comparability of all responses of countries this paragraph is structured according to the questions posed to the ministries. Then the responses of the countries are described and analysed in the context of other countries responses.

3.2.1. Rating the applications

To get a comparable look to the utility of 11 selected applications, countries were asked to rate each application. Instructions introducing this request were as follows:

"To what degree can each from the 11 applications lower the risk or impact of traffic accident involving cyclists in your country? Please rate each application from 1 (very low or no impact to traffic accidents) to 5 (substantial impact for reduction of traffic accidents) and explain why you choose this rating."

9 from 11 countries which responded to the request filled in the form for rating the applications. In the following part of the report the ranking of each application is analysed separately. The scale of the figures is from 1 to 5, no green column means negative response marked by 1.

Lexguard

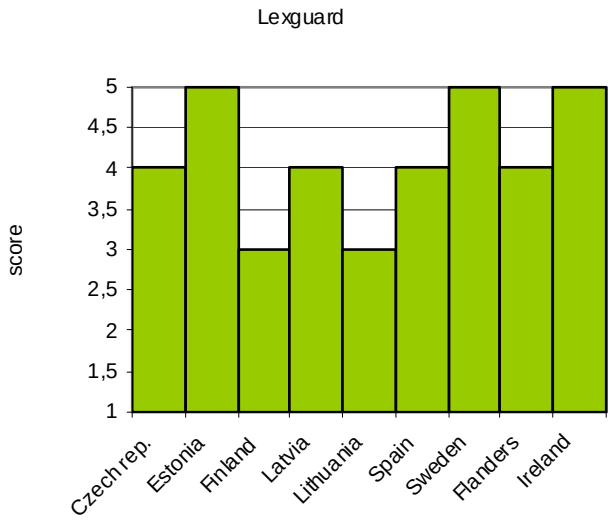

Figure 3.3. Rating of Lexguard

Country	Comment
Czech Rep.	Possibility of implementation to other assistance systems for driving support (ADAS).
Estonia	“Blind spot” accidents are one of the most common types of accidents on intersections.
Finland	Could have good effects on safety, assuming of course, that the device is working properly. The risk might be that driver relies too much on device warnings and ignores the pedestrians and cyclists if no warnings occurs.
Latvia	Can significantly reduce the number of casualties of cyclists.
Lithuania	This application may lower the risk of traffic accidents when vehicles' speed is low and only in cities or in places were cycling traffic is intensive.
Spain	Blind spots on buses and trucks produce many accidents every year especially in urban areas. So this device can be very effective.
Sweden	Address an important safety problem. Important to find solutions. This could be a part of the solution together with ex cycle boxes.
Flanders	Warning will motivate drivers to use all mirrors properly and not to start a manoeuvre in case of doubt.
Ireland	Peripheral detection on buses and trucks is required urgently. Not sure if the device only works on contact with cyclists?

Table 3.3. Comments on Lexguard

Bicycle Braking Light

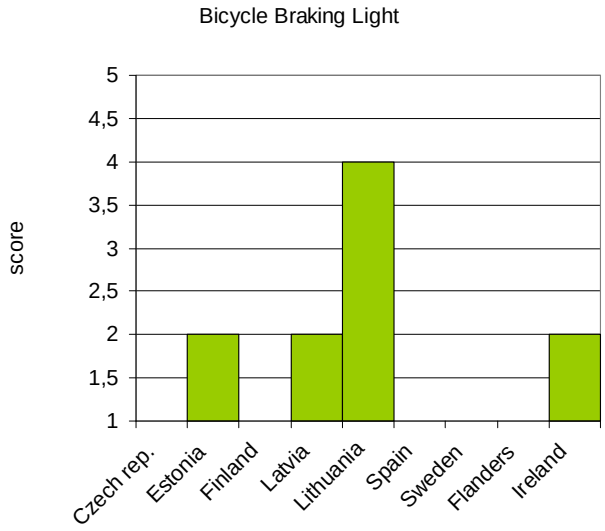

Figure 3.4. Rating of Bicycle Braking Light

Country	Comment
Czech Rep.	Usage only in groups of cyclists.
Estonia	Although there are more accidents involving two cyclists every year it is still not very common that the cause is that the bicycle in front is braking.
Finland	Rear-end collisions between cyclists in Finland is not a problem. Bigger problem is cyclists without any light, at the moment maybe 20 % of cyclist use light at dark. So we prefer normal rear light before braking light.
Latvia	Improve the visibility of bicycle.
Lithuania	All kinds of light sources help to draw the driver's attention.
Spain	Rear-end collisions caused because of cyclists braking suddenly are not seen as a problem in Spain so we do not think the device is going to be very effective to reduce accidents.
Sweden	More important to develop good brakes ex ABS on cycles.
Flanders	Obviously the developers are not aware of the fact that bicycles of 'cycle tourists' often do not have lights mounted as they mostly cycle during the day. It doesn't occur very often that a group of cyclists is that large that the last persons don't see what is going on in the head of the group, especially at dark.
Ireland	Not relevant to Ireland (yet) – don't have the density of cycling; don't have the penetration of ordinary back lights yet…

Table 3.4. Comments on Bicycle Braking Light

LEDmark

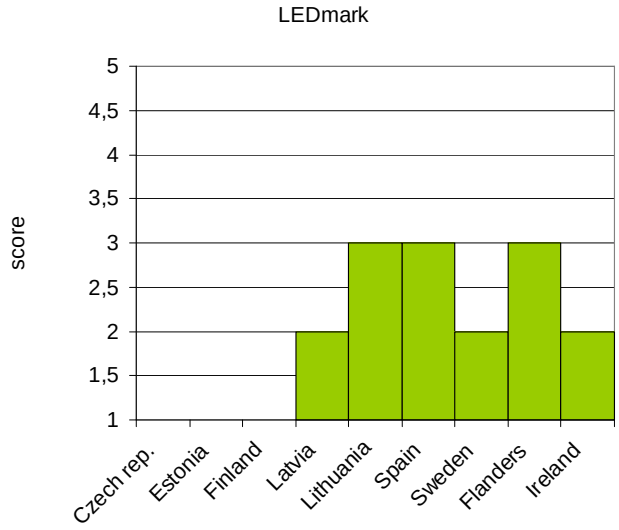

Figure 3.5. Rating of LEDmark

Country	Comment
Czech Rep.	Maintenance necessary, intervention to road construction necessary.
Estonia	As the number of bicycles is still considerably low, we don't think that this measure will have noteworthy impact on accidents.
Finland	Applicable to the special places like separating the bike lane from car lanes. Winter and snow plowing may cause problems.
Latvia	Improve the visibility of cycle path and reduced risk of departure the lane which reduced the risk collision with other vehicle.
Lithuania	All kinds of light sources help to draw the driver's attention. Negotiable about cost — benefit analysis.
Spain	We think the system is very useful on the roads where cyclists and the rest of traffic share the infrastructure.
Sweden	Not too important.
Flanders	Limited effect on road safety, but very good as a guidance system in case of lacking public lighting. The most frequently used cycle lights in Flanders do not lighten the cycle path enough.
Ireland	For unlit rural situations only e.g. national cycle routes, which would be almost cycle-free at night time?

Table 3.5. Comments on LEDmark

SaveCap

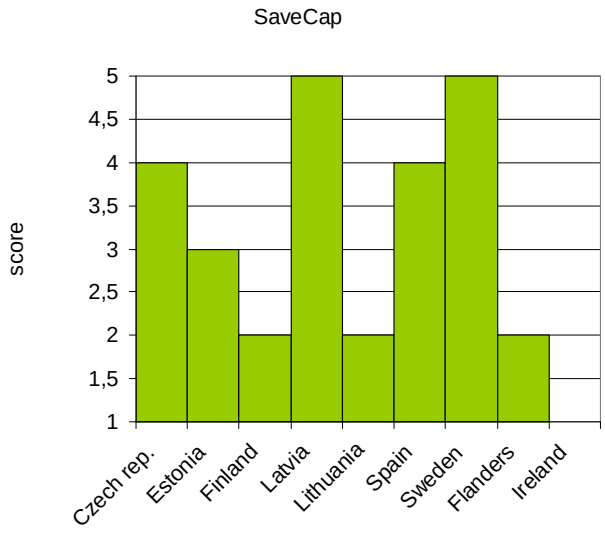

Figure 3.6. Rating of SaveCap

Country	Comment
Czech Rep.	Not accident prevention, possible combination with pedestrians.
Estonia	Main bicycle accident type is collision with a vehicle.
Finland	It is clear that softening the impact will reduce the severity of injuries of the cyclist. More efficient and faster way would be to increase the cyclists helmet use.
Latvia	Can reduce severity of injuries of cyclist.
Lithuania	Doesn't lower the risk or impact of traffic accident but lowers the injuries of cyclists.
Spain	We think the system proposed is very interesting and it can reduce the injuries and fatalities in accidents involving cyclists. But the main problem is to involve car manufacturers.
Sweden	Should be standard for all vehicles.
Flanders	Not enough information about the way how the system works (depending impact speed?, which kind of injuries are prevented? Collision angle?). Very long term needed to equip the whole vehicle park. The Flemish Region is not competent.
Ireland	Windscreen is a bigger problem than (currently pretty flexible) bonnet.

Table 3.6. Comments on SaveCap

Routeplanner Gent

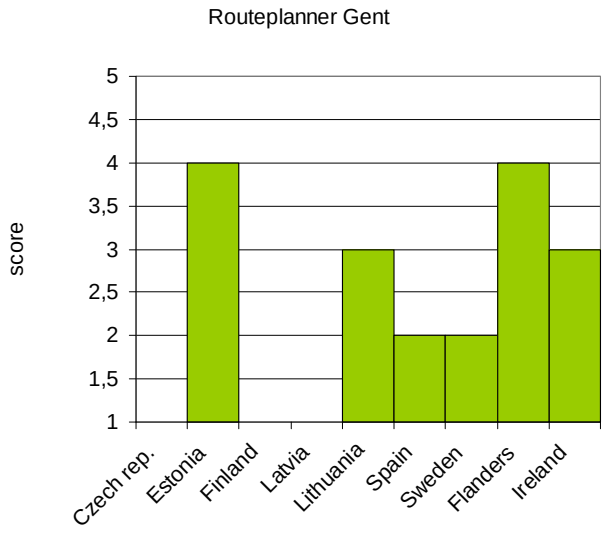

Figure 3.7. Rating of Routeplanner Gent

Country	Comment
Czech Rep.	Possibility of interconnection to other information systems and route planners, but compatibilty of information systems must be ensured first. Dangerous when used while riding (looking at the display).
Estonia	As our bicycle infrastructure is growing and there can be very various conditions, the up to date route planner would help bicyclists to find the best route.
Finland	Dangerous routes should not even be shown on routeplanners. Effects on safety may be limited, presumable only the minority of cyclist are looking for safer routes rather the shortest or fastest routes.
Latvia	Very small impact on cyclist safety.
Lithuania	This application may lower the risk of traffic accidents by avoiding high volume traffic.
Spain	A more informed driver is a safer driver, but we think the use of the navigator not produces impacts on traffic accidents involving cyclists.
Sweden	Not to revolutionary.
Flanders	Especially for recruiting new cyclists, route planners are an important way of communication, especially when bottlenecks are indicated. User feedback would increase the value of the route planner substantially.
Ireland	About to be rolled out by NTA (National Transport Authority) in any case.

Table 3.7. Comments on Routeplanner Gent

Citizens Connect

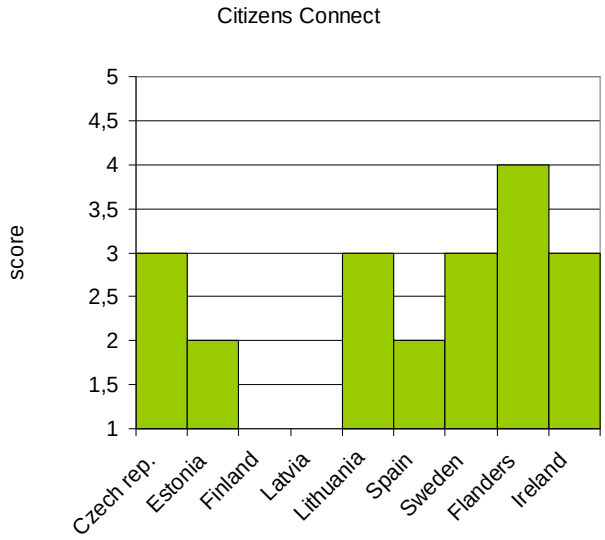

Figure 3.8. Rating of Citizens Connect

Country	Comment
Czech Rep.	Possibility of interconnection to other information systems and route planners, but compatibilty of information systems must be ensured first. Not sure if there is an impact on cyclists traffic safety.
Estonia	There are too many obvious problems with our bicycle infrastructure that it wouldn't have considerable impact.
Finland	If citizen reports really lead to repairs, the effects might be good, but rather on comfort than on safety. City of Helsinki had a similar trial system. The problem was information filtering and lack of resources in the repairs.
Latvia	Very small impact on cyclist safety.
Lithuania	There are Lithuanian informational websites (wvvw.trafficinfo.lt, www. sviesoforai.lt) on traffic conditions, etc.
Spain	A well informed driver is considered a safer one but we are not sure this can effective for cyclist.
Sweden	Important to improve maintenance.
Flanders	A beautiful application for a 'meldpunt fietspaden' (complaint registration cycle routes) will have an added value. It is important that the responsible departments for follow up are well organized to handle the remarks.
Ireland	General applicability; could be used in national rollout of FixMyStreet.ie;

Table 3.8. Comments on Citizens Connect

Individual Speed Adaptation

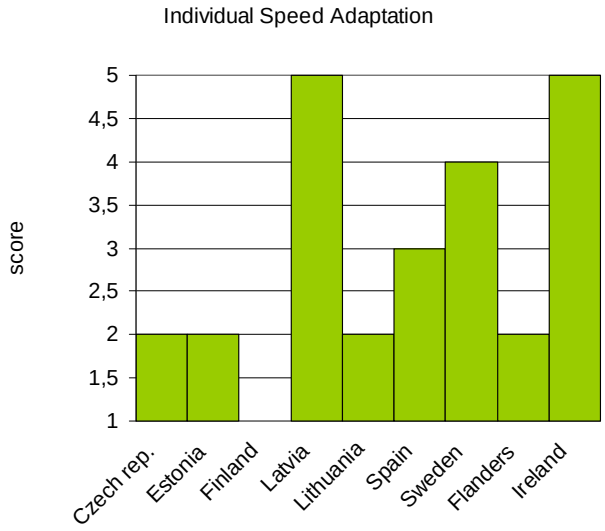

Figure 3.9. Rating of Individual Speed Adaptation

Country	Comment
Czech Rep.	Information on display may lower drivers attention to the traffic situation.
Estonia	The dangerous places are usually already somehow treated e.g. traffic calming.
Finland	Speed limits and warning signs are already used in order to pay drivers attention to the schools and day-care centers nearby. This system may give extra motivation on obeying the speed limits, but is it really 'intelligent', if the information given to driver is not based on real time detection of pedestrians and cyclists.
Latvia	Reduce the speed in specific road network areas and reduce the number of casualties with vulnerable road users.
Lithuania	It is good for drivers to know the information about traffic particularity.
Spain	Warning car drivers of dangerous situation around can be very positive for cyclist's visibility.
Sweden	Speed for cars is an important safety factor. Could be developed from ISA-systems that exist today f.e. in route planners.
Flanders	This application is a not obligatory in-car information system which gives useful information. However, notorious speeders will not install this application.
Ireland	This application has great opportunities into the future; the information and circumstances need to be regulated, to prevent information overload.

Table 3.9. Comments on Individual Speed Adaptation

Traffic Eye Zürich

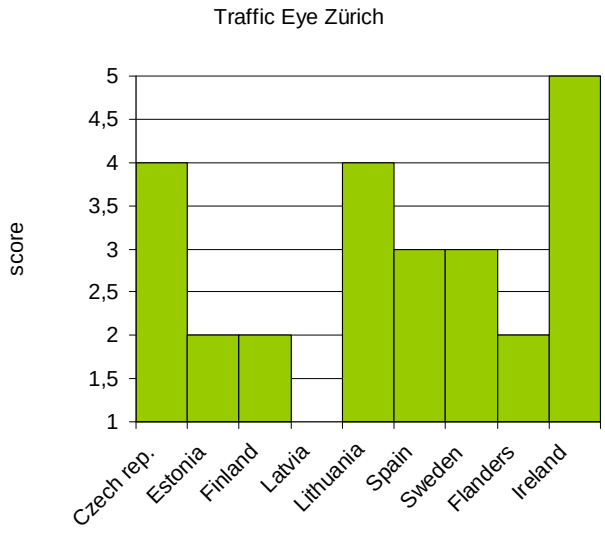

Figure 3.10. Rating of Traffic Eye Zürich

Country	Comment
Czech Rep.	High costs, different conditions in junctions – cyclists on cycle lane versus mixed.
Estonia	It would have some impact but moreover in the capital city where there are bus and tram lanes and co-using them with bicycles would get the bicycles away from car traffic.
Finland	Advance green for detected cyclist may have good effect on safety. However advance stop lines for cyclists (bike boxes) could give almost same effects.
Latvia	Very small impact on cyclist safety.
Lithuania	There are no trams in Lithuania, so there is no need to use that application. If the traffic is mixed (vehicles and bicycles), then bicyclists get a green light before vehicles do.
Spain	Very positive for cyclist at traffic lights because they need more time to start moving again.
Sweden	Address an important safety problem. Important to find solutions. This could be a part of the solution together with ex cycle boxes. But, should this apply to all ages and can, for example children handle this solution?
Flanders	Mixing cyclists and trams on the same road stretch should absolutely be avoided. Giving cyclist green before other traffic (which isn't innovative in itself) is positive for a safe traffic flow on an intersection in case it is an unavoidable situation.
Ireland	We need new ways of detecting cyclists for signalling systems (the particular application - along tram lines – is not a good example).

Table 3.10. Comments on Traffic Eye Zürich

Countdown Traffic Light

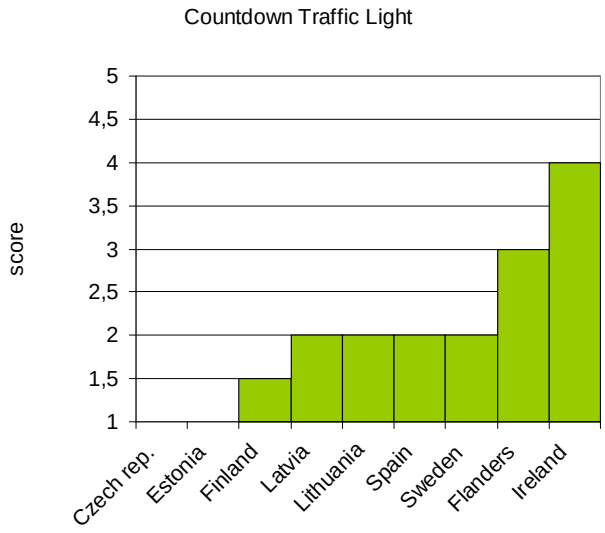

Figure 3.11. Rating of Countdown Traffic Light

Country	Comment
Czech Rep.	Improved effectivity of traffic regulation.
Estonia	Although violating the red light by bicyclists is one of the causes of accidents, we don't think the reason is long waiting time.
Finland	Poorly applicable if the traffic lights are dynamic controlled (adjusted their timing and phasing to meet changing traffic conditions), or if there are bus or tram priorities, which in many cases are in Finnish cities. Both cases can cause changes in waiting time, so lights can become count-down-up-down lights. Personal experience from Malaga Spain: When the light changed red, pedestrians stopped. But after seeing the countdown seconds, they crossed the street immediately because they felt the time was too long.
Latvia	Reduces crossing the road at red light.
Lithuania	Countdown system is convenient for bicyclists and improves traffic regulation.
Spain	The countdown Traffic light has been deployed in some cities in Spain. It is very useful for pedestrians but we think the system will not significantly reduce accidents involving cyclists.
Sweden	Potential to increase the number of cyclists but less potential for safety.
Flanders	May have a positive effect if the traffic light is properly adjusted (related to the amount of traffic and with sufficient green time for cyclists).
Ireland	Previous research in Dublin shows these are valuable in combination with short signal cycle times to reduce red light running.

Table 3.11. Comments on Countdown Traffic Light

Hind Sight

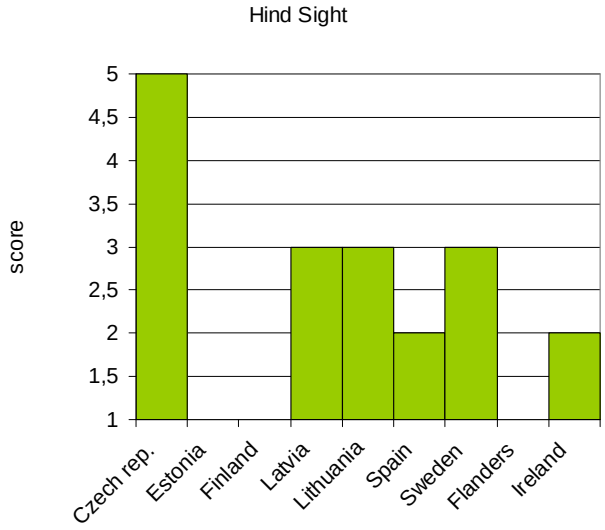

Figure 3.12. Rating of Hind Sight

Country	Comment
Czech Rep.	Lower attention to traffic situation when looking at the display. Reliability/authenticity of data on screen must be considered.
Estonia	The number of accidents which could have been avoided with such kind of application is seldom in Estonia. Rear-view mirror could be used instead.
Finland	Behind the vision devices are nice, but will hardly will be wide spread. Cyclists don´t consider even normal mirrors or mirrors attached to helmet necessary, though turning head backwards may be bad for stability.
Latvia	Improve the traffic information of situation around bicycle and decrease risk make wrong manoeuvre.
Lithuania	This device features are similar to the rear view mirrors.
Spain	The interface proposed seems interesting because cyclists can be aware what is happening around easily but on the other hand we think that the possibilities of cyclists to avoid an accident are lower than the car driver of the vehicle involved in the accident because the speed differs between them.
Sweden	Important not to turn your head while biking. Easy to steal?
Flanders	Looking back yourself when making an manouvre seems to be safer, e.g. to estimate the distance and approaching speed of cars coming from behind. When you have to focus on a screen, you're not watching enough forward and sideward. Price?
Ireland	Perhaps useful in road racing only – not for urban cycling, where full peripheral cognisance needed. More time required to look down and examine the screen rather than turn head around?

Table 3.12. Comments on Hind Sight

Light Lane Bike

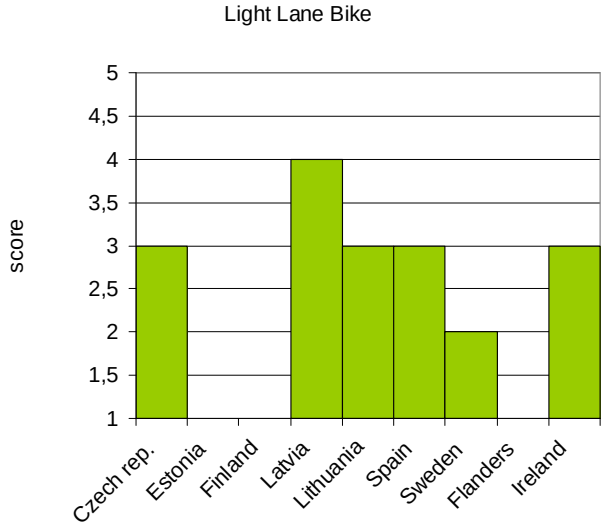

Figure 3.13. Rating of Light Lane Bike

Country	Comment
Czech Rep.	Good supplement of red rear-light, easy to remove.
Estonia	Usually cyclist use back light so the effect of the application would be minor.
Finland	In principle any gadget increasing the cyclists visibility is good, but the colours and symbols must be according legislation. Would the normal red rear light do the same?
Latvia	Improve the visibility of bicycles and reduced the risk of collision with cyclist.
Lithuania	All kinds of light sources help to draw the driver's attention.
Spain	The system can be interesting inside built-up areas where the speed is lower but outside built-up areas maybe is more difficult to see the light projection on the road. Besides it's necessary to evaluate the effectiveness, the cost and the legal framework.
Sweden	Not to useful when having good infrastructure and good light conditions.
Flanders	Nice gadget, but not a replacement for cycle lanes.
Ireland	Already commercially available in the Netherlands.

Table 3.13. Comments on Light Lane Bike

Summary of ranking the applications

General overview of ranking from all 9 countries is described in figure 3.12.

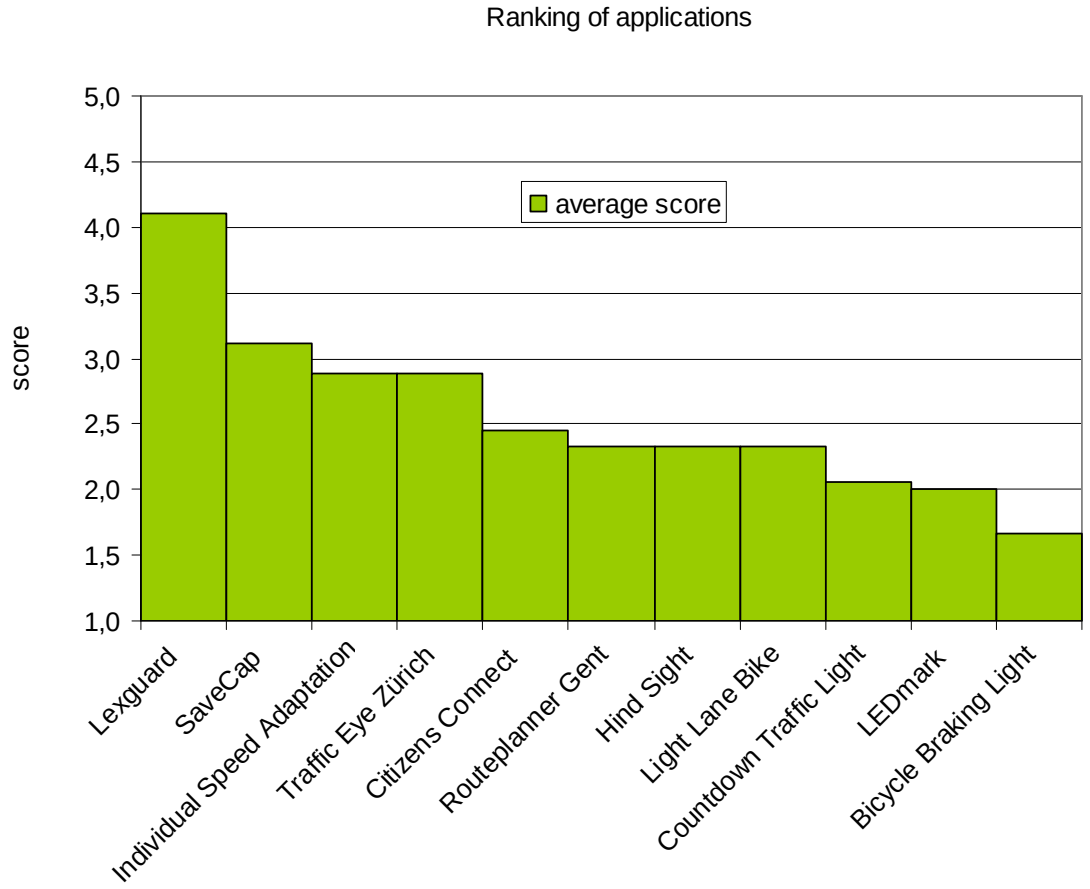

Figure 3.14. Average ranking of applications; 9 countries

Lexguard is a winner and scores very high (4,1). In most countries it seems to be the most progressive application in terms of safety of cyclists. Savecap (3,1) is in second place, but far behind Lexguard, also ISA – Individual Speed Adaptation and Traffic Eye Zürich score above the average and are in “possitive” interval of ranking (2,9 both).

Bicycle braking light got the worse ranking (1,7) followed by LEDmark (2,0) and Countdown traffic light (2,1).

Interesting is the comparison of the average scores when we consider Eastern European countries (Czech Rep., Estonia, Latvia, Lithuania) and Western European countries (Belgium – Flanders, Finland, Ireland, Spain, Sweden) separately which is shown in the following figure.

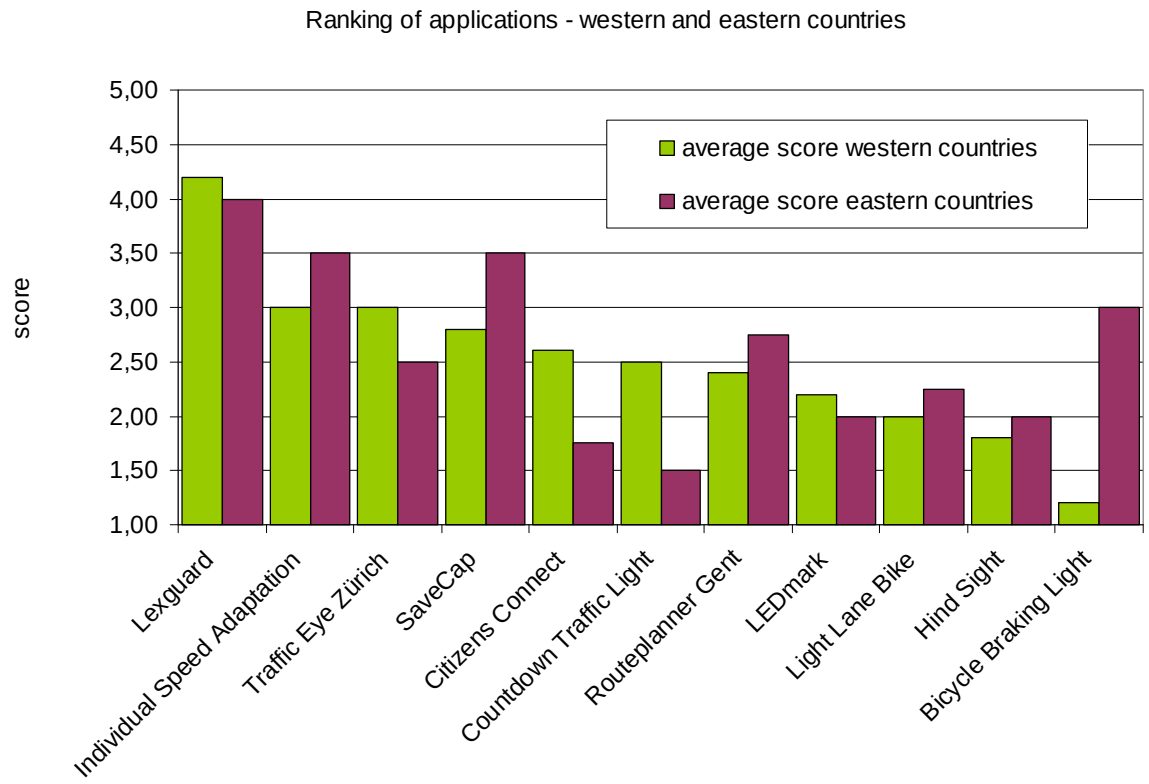

Figure 3.15. Ranking of applications – comparison of Western and Eastern Europe.

Great differences between the ranking in Eastern and Western Europe can be found for Bicycle Braking Light (average score 1,2 for Western Europe and 2,25 for Eastern Europe; total difference 1,05), Safecap (2,8; 3,5; 0,7), Hind Sight (1,8; 3,0;1,2) and Light Lane Bike (2,0; 2,75; 0,75). Those applications are assessed higher in Eastern Europe. Oppositely Countdown Traffic Light scores remarkably better in Western Europe (2,5; 1,5; 1,0).

The assumed reason for these differences is that in Eastern Europe every 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.

Some applications score considerably lower in Eastern Europe because they are not in practice overthere and good experiences from Western Europe are not known yet in the Eastern European countries. Good examples are the Countdown Traffic Light and Traffic Eye Zürich.

Applications which are based on smart information provission to the user are rated higher in Western Europe, for example Countdown Traffic Light, ISA, Routeplanner Gent and Citizens Connect.

To conclude, 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.

Regarding warning applications opinion of European countries is that Lexguard is most useful and safety contributing application. Maybe the view at its purpose can show the way ahead. Lexguard prevents very concrete types of accidents where both vehicles (bike and

truck), location (junction) and position and driving manoeuvre (right turning of truck cross the way of cyclist) are clearly defined. In this aspect the assumption is whether these types of ´monofunctional´ application focused on unique traffic situation are the way for future interest instead of wide-range universal applications.

3.2.2. Possibilities and conditions of deployment

The next part of the request for information sent to the ministries was introduced by the following question:

"What are the possibilities and conditions of deployment of each application in your country? (legislative regulations for using some applications, necessity of permissions, approvals)."

This chapter is also structured according to the applications, responses of the ministries are shown in figures.

Lexguard

Country	Answer
Czech Republic	Available on market, necessity of homologation/certification
Estonia	There are no limitations to use this kind of equipment.
Finland	No specific legislation, deployment possible.
Latvia	Cannot be mandatory introduction. Freight and passenger carrier companies must be informed about the benefit of such applications.
Lithuania	-
Norway	Easy to deploy.
Spain	Easily to deploy it because the device is already homologated by EU but making the device compulsory for trucks need some cost-benefit analysis and it is not going to be fast.
Sweden	Up to industry.
Belgium - Flanders	The only barrier to take is probably the cost of investment for the transport company. Flanders could set up a pilot, but for subsidy programmes, other financial sources should be found.
Ireland	-

Table 3.14. Comments on deployment of Lexguard

Bicycle Braking Light

Country	Answer
Czech Republic	-
Estonia	There are no limitations to use this kind of equipment.
Finland	Not forbidden nationally, deployment possible.
Latvia	Cannot be mandatory introduction. Organisations which are involved in road safety must more inform society about benefits and impacts of safety.
Lithuania	-
Norway	Easy to deploy.
Spain	Our national legislation does not include the possibility of having this kind of light for bicycle and changing it needs some time because it is an important modification so the deployment would be slow.
Sweden	Regulation probably needed.
Belgium - Flanders	No Flemish administrative jurisdiction, but can come on the market without any problem.
Ireland	-

Table 3.15. Comments on deployment of Bicycle Braking Light

LEDmark

Country	Answer
Czech Republic	-
Estonia	There are no limitations to use this kind of equipment.
Finland	Requires trial permission from ministry.
Latvia	Cannot be mandatory introduction. Organisations which are responsible of infrastructure safety must be informed about benefits and impacts of safety by use of such device.
Lithuania	-
Norway	Relatively easy to deploy.
Spain	Same problems as bicycle braking light.
Sweden	?
Belgium - Flanders	Could be integrated in the Vademecum Fietsvoorzieningen (guidelines cycle facilities). Application in projects which are (co)-financed by the Flemish government in order to test the usefulness and the sustainability of the applications.
Ireland	-

Table 3.16. Comments on deployment of LEDmark

SaveCap

Country	Answer
Czech Republic	Necessity of homologation/certification. Uniform technical specifications for developers are missing.
Estonia	Depending on the construction of the system, there is a possibility of having to pass a national approval.
Finland	Requires European type approval legislation.
Latvia	Cannot be mandatory introduction. Organisations which are involved in road safety must more inform society about benefits and impacts of safety.
Lithuania	-
Norway	Easy to deploy as an optional ad-on for cars, but difficult to make mandatory.
Spain	No problems as for legal framework but it is needed a commitment of carmakers to install the device in cars.
Sweden	Up to industry.
Belgium - Flanders	Not a Flemish administrative jurisdiction. See international vehicle regulations.
Ireland	-

Table 3.17. Comments on deployment of SaveCap

Routeplanner Gent

Country	Answer
Czech Republic	Non-uniform information systems in Czech Republic.
Estonia	There are no limitations to use or make this kind of application.
Finland	Deployment possible.
Latvia	Cannot be mandatory introduction. Bicyclists must be informed about benefits and impacts of safety.
Lithuania	It is much easier to plan freight transport and logistics operations with accurate information about roads infrastructure, limitations, traffic, and weather conditions. This information is also important for other users (public utilities providers, digital maps creators, individuals). Basic

Country	Answer
	traffic planning infrastructure was developed and it has been already in use since 2011 (website: www.trafficinfo.lt). It is expected to expand weather condition tracking posts network and to create detailed roads infrastructure network database in 2014-2020. Purpose of the database is to collect, save, manage, and give information (road data, traffic data) to interested institutions, organizations, companies and individuals. More specifically, database should share information about speed limitations, forbidden turns and others prohibitions, measures of road, bridges, public transport schedules, stations and the whole transport infrastructure. The purpose of inquiry could be various (route planning websites. digital maps and applications developers and etc.). Centralized and fully accessible database will facilitate coordination of ITS development and deployment in Lithuania.
Norway	Easy to deploy. A route planner for bicycles is in operation for three cities (areas) in Norway. The route planner take speed limits and traffic flow into account among other variables. It would be relatively easy to add variables such as tram tracks, cobble stones etc. if that is not already in the route planner. Link: http://www.sykkelveg.no/hedmarken/no/Home/Index
Spain	No legal problems but it depends on service providers.
Sweden	No obstacles.
Belgium - Flanders	On the longer term, a route planner for cyclists for the territory of Flanders is very desirable. Good information about cycle facilities (partly available in cycleGIS) is essential to make this possible.
Ireland	-

Table 3.18. Comments on deployment of Routeplanner Gent

Citizens Connect

Country	Answer
Czech Republic	Non-uniform information systems in Czech Republic.
Estonia	There are no limitations to use or make this kind of application.
Finland	Deployment possible.
Latvia	Cannot be mandatory introduction. Bicyclists must be informed about benefits and impacts of safety.
Lithuania	It is much easier to plan freight transport and logistics operations with accurate information about roads infrastructure, limitations, traffic, and weather conditions. This information is also important for other users (public utilities providers, digital maps creators, individuals). Basic traffic planning infrastructure was developed and it has been already in use since 2011 (website: www.trafficinfo.lt). It is expected to expand weather condition tracking posts network and to create detailed roads infrastructure network database in 2014-2020. Purpose of the database is to collect, save, manage, and give information (road data, traffic data) to interested institutions, organizations, companies and individuals. More specifically, database should share information about speed limitations, forbidden turns and others prohibitions, measures of road, bridges, public transport schedules, stations and the whole transport infrastructure. The purpose of inquiry could be various (route planning websites. digital maps and applications developers and etc.). Centralized and fully accessible database will facilitate coordination of ITS development and deployment in Lithuania.
Norway	Easy to deploy. It exists a similar system in Norway “Fiks gata mi” (Repair my street) with a web-page and an application for androids.

Country	Answer
	Link: http://www.fiksgatami.no/
Spain	Same as Routeplanner Gent.
Sweden	No obstacles.
Belgium - Flanders	In 2013 a smartphone application will be build, continuing on the existing 'Meldpunt fietspaden' (complaint registration cycle routes).
Ireland	-

Table 3.19. Comments on deployment of Citizens Connect

Individual Speed Adaptation

Country	Answer
Czech Republic	Necessity to provide ITS infrastructure on roads for communication between infrastructure and vehicle.
Estonia	There are no limitations to use or make this kind of application.
Finland	Deployment possible.
Latvia	Cannot be mandatory introduction. Organisations which are involved in road safety must more inform society about benefits and impacts of safety.
Lithuania	It is much easier to plan freight transport and logistics operations with accurate information about roads infrastructure, limitations, traffic, and weather conditions. This information is also important for other users (public utilities providers, digital maps creators, individuals). Basic traffic planning infrastructure was developed and it has been already in use since 2011 (website: www.trafficinfo.lt). It is expected to expand weather condition tracking posts network and to create detailed roads infrastructure network database in 2014-2020. Purpose of the database is to collect, save, manage, and give information (road data, traffic data) to interested institutions, organizations, companies and individuals. More specifically, database should share information about speed limitations, forbidden turns and others prohibitions, measures of road, bridges, public transport schedules, stations and the whole transport infrastructure. The purpose of inquiry could be various (route planning websites. digital maps and applications developers and etc.). Centralized and fully accessible database will facilitate coordination of ITS development and deployment in Lithuania.
Norway	No legislative problems for deploying.
Spain	No legal problems to install it on bicycles.
Sweden	Up to industry.
Belgium - Flanders	Flanders is working on a digital map with speed limits to offer to navigation providers.
Ireland	-

Table 3.20. Comments on deployment of Individual Speed Adaptation

Traffic Eye Zürich

Country	Answer
Czech Republic	Difficult for uniform deployment.
Estonia	For using this kind of solutions, the national traffic act must be changed.
Finland	Deployment possible.
Latvia	Cannot be mandatory introduction. Organisations which are involved in road safety must more inform society about benefits and impacts of safety.
Lithuania	It is much easier to plan freight transport and logistics operations with accurate information about roads infrastructure, limitations, traffic, and

Country	Answer
	weather conditions. This information is also important for other users (public utilities providers, digital maps creators, individuals). Basic traffic planning infrastructure was developed and it has been already in use since 2011 (website: www.trafficinfo.lt). It is expected to expand weather condition tracking posts network and to create detailed roads infrastructure network database in 2014-2020. Purpose of the database is to collect, save, manage, and give information (road data, traffic data) to interested institutions, organizations, companies and individuals. More specifically, database should share information about speed limitations, forbidden turns and others prohibitions, measures of road, bridges, public transport schedules, stations and the whole transport infrastructure. The purpose of inquiry could be various (route planning websites. digital maps and applications developers and etc.). Centralized and fully accessible database will facilitate coordination of ITS development and deployment in Lithuania.
Norway	No legislative problems for deploying.
Spain	No legal problems to install it on streets.
Sweden	Unlikely?
Belgium - Flanders	Giving anticipating green and “vooruitgeschoven opstelvakken” for cyclists are already common use in Flanders. A detection system for cyclists would be new.
Ireland	-

Table 3.21. Comments on deployment of Traffic Eye Zürich

Countdown Traffic Light

Country	Answer
Czech Republic	-
Estonia	Countdown traffic lights are already used for pedestrian, so there are no constraints to use them.
Finland	Requires trial permission from ministry.
Latvia	Cannot be mandatory introduction. Organisations which are responsible for infrastructure safety must be informed about benefits and impacts of safety by using such devices.
Lithuania	Lithuania already uses Countdown Traffic Light.
Norway	Relatively easy to deploy. There has been a test with two traffic lights with countdown from green to red light with little success.
Spain	No legal problems and there already some similar devices installed for pedestrians.
Sweden	Unlikely?
Belgium - Flanders	Application depends on the road owner AWV and the local governments. On the long term, these systems will be used in Flanders (depending on optimisation of traffic lights). Inclusion in the guidelines for cycle facilities is possible.
Ireland	-

Table 3.22. Comments on deployment of Countdown Traffic Light

Hind Sight

Country	Answer
Czech Republic	-
Estonia	There are no limitations to use this kind of equipment.
Finland	Deployment possible.
Latvia	Cannot be mandatory introduction. Organisations which are involved in road safety must inform society about benefits and impacts of safety.

Country	Answer
Lithuania	-
Norway	Easy to deploy.
Spain	No legal problems to install it on bicycles.
Sweden	Up to industry.
Belgium - Flanders	If this is on the market, individual cyclists have to buy it.
Ireland	-

Table 3.23. Comments on deployment of Hind Sight

Light Lane Bike

Country	Answer
Czech Republic	-
Estonia	There are no limitations to use this kind of equipment.
Finland	Not possible. Color and use of bike symbol this way is against Finnish legislation.
Latvia	Cannot be mandatory introduction. Bicyclists must be informed about benefits and impacts of safety.
Lithuania	-
Norway	Easy to deploy.
Spain	Our national legislation does not include the possibility of having this kind of devices for bicycles and changing it needs some time because it is an important modification so the deployment would be slow.
Sweden	Unlikely?
Belgium - Flanders	If this is on the market, individual cyclists have to buy it.
Ireland	-

Table 3.24. Comments on deployment of Light Lane Bike

Summary

To conclude figures above, two main views on the responses are available:
- necessity of permissions, approvals
- legislative regulation for usage of the applications

a) Permissions and approvals for deployment

Applications easy to deploy, without any permissions and approvals necessary in responded countries:

No regulations
- Bicycle Braking Light
- Hind Sight
- Light Lane Bike

In modification already on the market
- Citizens Connect
- Routeplanner Gent
- Traffic Eye Zürich

Available on the market
- Lexguard
- Bicycle Braking Light

Applications where **some kinds of permissions** and approvals are/might be necessary:
- LEDmark – in Finland requires trial permission from ministry, in Sweden maybe

- Countdown Traffic Light - somewhere on market, in Finland requires trial permission from ministry

Applications where **permitions and approvals are necessary**:

- SaveCap - requires European type approval legislation

In case of Individual Speed Adaptation no clear answers were recieved, so this application can not be added to any of the three groups above.

b) Legislative regulation for usage the application

Acceptable or **no conflicts to legislative regulations** for usage in all questioned countries:

- Lexguard
- Routeplanner Gent
- Citizens Connect
- Traffic Eye Zürich
- SaveCap
- Individual Speed Adaptation

Not acceptable in some countries:

- Bicycle Braking Light
  - Spanish national legislation do not include the possibility of having it on bike
- LEDmark
  - Finland requires trial permission from ministry,
  - Sweden maybe
- Countdown Traffic Light
  - Finland requires trial permission from ministry
- Light Lane Bike
  - Finland not possible: color and use of bike symbol this way is against finnish legislation
  - Spanish national legislation do not include the possibility of having it on bike

c) Strong and weak points of the application

This section describes main strong and weak points of the applications as they were identified by ministries and gives recommendations how to keep the strong ones and solve the weaknesses. More detail information from experts point of view can be found in Deliverable of WP3 – SWOT analysis.

Application	Strong points	Weak points
Lexguard	Available on market, easy to deploy.	Cost of investment for the transport company is not known
	Recommendation: Legislation could speed up use of this kind of applications (also provided as part of new vehicles)	Recommendation: Cost benefit analysis in each country can be a basis for discussions whether the application might be obligatory
Bicycle Braking Light	Available on market, easy to deploy.	Not legal in Spain (and probably in some other countries), very small amount of accident to prevent

Application	Strong points	Weak points
	Recommendation: Research is necessary to evaluate the impact on traffic safety	
LEDmark	Good as a guidance system in case of lacking public lighting	Not acceptable in all countries, limited usage, maintenance needed
	Recommendation: Further research needed to set the criteria for placement	Recommendation: Further research needed for evaluating the benefits
SaveCap	Reduction of accident impact	Long term needed to equip cars, problem is to involve car manufacturers
	Recommendation: Further research is needed to define types of accidents which can be induced. Together with protection of pedestrians SaveCap can be made mandatory for all vehicles	
Routeplanner Gent	Desirable application although impact on safety is not clear	Limited effect on safety, minority of cyclist are looking for safer routes rather the shortest or fastest routes
	Recommendation: Exploitation for bigger area, provide more information about cycle facilities. Deeper analysis needed to indentify impact on bicycle traffic.	
Citizens Connect	Possibility of interconnection to other information systems and route planners	Very small impact on cyclist safety, more focus on comfort
	Recommendation: Application can be used for more purposes, not only for cyclists. It can be interconnected to route planners	Recommendation: Application should be presented like tool for getting information from citizens to improve comfort. Safety is not the main purpose of the application.
Individual Speed Adaptation	Possible synthesis with route planners, digital maps with speed limits can be offered to navigation providers	Not obligatory, notorious speeders will not install this application, speed limits and warning signs are already used
	Recommendation: Impact analysis to drivers attention needed, the information and circumstances need to be regulated, to prevent information overload	
Traffic Eye Zürich	Good effect on safety	Mixing cyclists and trams on the same road stretch should be avoided, advance stop lines for cyclists (bike boxes) could give almost same effects
	Recommendation: Traffic Eye Zürich is the application suitable for specific situation where public transport and cyclists use the same roads. The traffic volume of both modes is one of the key parameters when assessing the convenience of usage of this application. More research is needed to determine the circumstances of usage and the impact on safety. Maybe application can also be extended to situations with cyclists and trucks.	
Countdown Traffic Light	Previous research in Dublin shows that this application is valuable in combination with short signal cycle times to reduce red light running.	Poorly applicable if the traffic lights are dynamic controlled, or if there are bus or tram priorities.
	Recommendation: Except Flanders and Ireland no positive reactions to the safety impact of this application. Short signal cycle times seem to be fundamental factor of	Recommendation: The range ot usage of Countdown Traffic Light is limited to fixed controlled lights without priorities of public transport.

Application	Strong points	Weak points
	success. More research needed to find relationshop between cycle times and on red crossings.	
Hind Sight	Good for stability of cyclists – no turning head backwards, the application is already on market	Rear view mirrors are cheaper and the effect is the same.
	Recommendation: The usage of this application is limited to the specific groups of cyclists and specific situaton – groups of cyclists, parents watching their kids behind, etc. Hind Sight is the assistent, it can not take all responsibility for interpreting the situation behing the cyclists.	Recommendation: True, but Hind Sight can record the situation so it is possible to review what happened behind you in case of an accident. This feature has to be promoted more for specific target groups, e.g. elderly.
Light Lane Bike	Increasing the cyclists visibility	Not necessary when having good infrastructure and good light conditions, Colours and symbols are not according to the legislation – problems in Finland ans Spain, Not a replacement for cycle lane.
	Recommendation: Light Lane Bike can be supplement to a back light in areas with low lighting and speed up to 50km/h where cyclists use the same road as cars.	Recommendation: Modifications of colour and symbols can be introduced to meet the legislation in countries where problems are expected.

Table 3.25. Summary of strong and weak points of application.

3.2.3. Recommendation for new application

This paragraph describes and analyses answers to the question:
"Besides the 11 applications, what kind of ITS application could decrease the risk or impact of accidents involving cyclists in your country?"

Country	Answer
Estonia	Any kind of warning system on intersections if there is a risk of conflict between bicycles and cars.
Latvia	No idea
Spain	We are not aware of any other ITS applications to decrease the risk of accidents involving cyclists.
Sweden	ISA (Intelligent Speed Adaptation) in cars
Belgium - Flanders	- ISA, but in combination with influencing the vehicle (e.g. contra presure on the gas pedal). - In Flanders better adjusted traffic light systems will increase the safety of cyclists: related to the amount of traffic and without conflicts. - If the domain of ITS is widened towards cycle theft: secure automatic bicycle parkings and equipping bicycles with chips would be very helpful (if people ride on better bicycles, it is also better for their safety)

Table 3.26. Recommendation for new e-safety application

Not many responses were collected. Obvious fact is that ISA is a perspective application. There might be a request from safety experts to enable ISA to reduce the speed of cars automatically without regard to drivers will.

4. Research and financing

4.1. National research

This paragraph describes and analyses answers to the questions:
"Is there any segment of national research programmes focused on ITS related to bicycle traffic? If so, is the research into ITS and cycling carried out at the appropriate level from the perspective of Your Ministry? What kind of ITS-cycling research is in progress or planning phase? Does Your Ministry (or another national institution) provide any financial support for such kind of research?"

Country	Answer
Czech Republic	New transport strategy for the years 2014-2020 the Ministry will elaborate action plan for ITS to cover activities on national level in ITS for all transport modes. Measures, terms of realization and financing will be part of it. There is no research executed directly under Ministry of Transport. Ministry exploits possibilities of national Technological Agency of the Czech Rep. and its programmes Alfa and Beta. Regarding traffic safety there is also possibility to use Safety Research of Ministry of the Interior of the Czech Rep.
Estonia	No
Finland	At the moment no ITS related research on cycling
Latvia	No
Lithuania	Ministry of Transport and Communications, Ministry of Economy and Ministry of Environment are currently preparing Action Plan "Lithuania Bicycle Infrastructure Development for 2014-2020".
Norway	-
Spain	There is a road safety strategy for 2011-2020 approved by Government in which is included many measures to improve cyclist's safety and mobility but they are infrastructure or training measures. Any national research programs focused on ITS related to bicycles have not been scheduled because the number of cyclists is still low in many Spanish areas and the use is mainly focused on leisure and sport activities but as the number for usual mobility is growing inside cities they can be considered depending on how fast the use is growing and the user's demand.
Sweden	There are research in Sweden focused on ITS related to bicycling similar to those in your project (ex CyCity). There are financial supports from the state level.
Belgium - Flanders	- Research on the use of bikeshare systems is planned (Velo in Antwerpen and Blue-bike). We are interested in one card (ITS component) giving access to the different systems. - Rate your ride van Bike-to–work is subsidized by the Flemish government. - There is a research project going on around electric mobility ('proeftuin' EV) - For good road safety projects, subsidies are available.
Ireland	-

Table 3.27. National research on e-safety

From the nine Ministries, only Sweden and Belgium (Flanders) provide research or support on ITS and cycling. We don't have enough information from other ministries to draw more general conclusions. Research from other points of view is analysed in the next chapter.

4.2. European research

Besides monitoring the situation in European countries through the request to the ministries as described above, we made an analysis of available research projects related to the theme of the SAFECYCLE project.

Focus was on following sources of research:
- EU projects and research programmes
- university projects
- national research institutes
- research articles provided at web pages of cyclists organisations

Primarilly the attention was focused to the international field and on than specifically to topics of research projects which are related to:
- cycling
- safety – projects whose focus can be relevant or utilized for SAFECYCLE theme
- ITS/ICT projects whose focus can be relevant or utilized for SAFECYCLE theme

95 items of research projects were searched out and transformed into figure attached (see Annex I). Many research projects and articles can be found on cycling and safety topics, ITS and ICT, but there is not the same focus as SAFECYCLE project, although WATCH – OVER and NAVIKI project (see below) are combining ITS and cycling.

The research projects which can be the basis for possible continuity of SAFECYCLE project are – in terms of the area covered, time period and focus:

Main topic ICT or ITS:

- CONDUITS - Coordination of network descriptors for urban intelligent transportation systems (May 2009 - April 2011)
- eSafety Support - Supporting the European effort on eSafety and sustaining the work of the eSafety Forum activities (January 2006 - December 2008)
- CONNECT - Co-ordination and stimulation of innovative ITS activities in Central and Eastern European Countries (May 2004 - March 2009)
- 2DECIDE - Toolkit for sustainable decision making in ITS deployment (October 2009 – September 2011)
- Instant Mobility - Future Internet for Smart, Efficient & Green Mobility (April 2011 - March 2013)

Main topic cycling and ITS/ICT:

- WATCH-OVER (January 2006 – December 2008)
  The technical challenge is the development of a cooperative system for real time detection and relative localisation of vulnerable users that includes innovative short range communication and video sensing technologies. The implementation challenge is the deployment of a reliable system that is versatile for different vehicles and vulnerable road users.

- NAVIKI - Energy Efficiency through Web 2.0 Bicycle Navigation and Communication (May 2011 – January 2014)
  The Naviki project aims at promoting cycling in European cities and touristic areas by rolling out a European internet platform for navigation, communication and planning in the field of cycling. Thus it intends to reduce greenhouse gas emissions and to promote

a less car-dependent lifestyle by making the bicycle a still more attractive means of transport. Naviki addresses a range of national, topical and demographic target groups, from individual users (cyclists, motorists, tourists) to municipalities, corporations and organisations. In Naviki any cyclist will be able to discover the best cycle paths all over Europe and to publish them online. Official partners can specifically indicate paths with a certified quality standard. With the help of Naviki partners like municipalities, regions, touristic associations and many others are able to offer their users and citizen a special service, to inform and communicate in a modern way and to make their location more attractive to cyclists. Cities or organisations interested in using the Naviki navigation platform in their regions are invited to contact the project coordinator to receive more information.

There are many projects focused ´only´ on cycling and safety. They are shown in Annex I.

Financing

Besides different national funds for research in ITS and cycling, the EU is the main provider of the subsidy for various topics of research. The SAFECYCLE project ends in the year when one period is over. The next series of calls will start in the year 2014 with Horizon 2020. The details of possibilities of subsidies is not known yet.

In Annex H an overview of EU programs for finacing research related to the SAFECYCLE theme is shown.

It can be recommended to set the rules in that way that a SAFECYCLE project - version 2.0 could have opportunity to be launched at the year 2014, i.e. a project focusing on ICT and ITS in relation to cycling. It is possible to go for a wider scoop, including other topics than safety of cyclists.

Conclusion and recommendation

Through the 18 months of the SAFECYCLE project, only two research projects were found which are focusing at cycling **and** ITS or ICT. These projects are WATCH–OVER and NAVIKI. As WATCH-OVER aims mostly at cooperative systems using real time detection and NAVIKY at searching optimal cycling pahts, both can be viewed as a subset of SAFECYCLE range of interest.

Research focusing on ICT and ITS and cycle traffic is not common yet, based on the information we got from the ministries. It seems that in Western European countries this issue is actual and will get more attention in the near future.

Research analyses also showed that Eastern European countries focus preferably on infrastructure for cycling in terms of cycle paths and lanes. Many projects are based on transfering know how of promoting and designing infrastructure from the West to the East.

Not only technical research and developments is the area where to put the effort. More effort has to be put on evaluating the impacts of e-safety applications for cyclists.

5. Conclusion and recommendation for future development

The objective of the SAFECYCLE project is to find ICT and ITS applications for safer cycling, to assess their impact and to come up with recommendations for further development. During the previous steps of the project different issues and problems arised related to the introduction and implementation of e-safety applications for cyclists. In this chapter we give recommendations for five top rated application (see chapter 3) and general recommendations on the three themes discussed in the previous chapters, i.e.:

- Standardisation
- Deployment
- Research agenda

Apart from that recommendations for transport policies were included as well.

Horizon 2020, the European programme covering period 2014 – 2020, is likely to be the programme that will be able to finance further research activities in line with the theme of SAFECYCLE project. All of the recommendations below should be part of this programme.

5.1 Recommendations for five top rated application

Lexguard
Peripheral detection on buses and trucks is required urgently, that is the reason why Lexguard (or similar type of blind spot systems) is the best rated application.
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.

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.

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

Traffic Eye Zürich
The traffic volume of both modes 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.

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).

5.2 Recommendations for standardisation

General recommentadion is to support standardisation in ICT/ITS field as the corner stone of future development of pan-European applications that can spread good practice around Europe.

Focus:

- Further research results on a possible future concept of **active communication** bike-to-car and bike-to-infrastructure to be included in the concept of cooperative systems that is already standardized (CEN/TC 278/WG 16 and ISO/TC 204/WG 18)

  The cooperative systems of the future is a concept connecting vehicles to vehicles and vehicles to infrastructure to enhance traffic safety and efficiency. The concept does not count with cyclists. This is a fact that should be tackled as cycling is the promoted means of transport for sustainable mobility and as such should be promoted as equal mobility tool as other modes of transport supported within the concept of cooperative systems. Cycling in the cooperative system concept is regarded as a passive solution – on one hand it relies on cyclists being equipped with their mobile phones and the mobile phones are to be detected by smart systems and so to assure their safety through such a detection. On the other hand the safety could be enhance by an in-vehicle detection system that can recognize a cyclist and warn the driver. The potential of the concept of internet of things or smart grid networks and smart cities should take into account cycling as an integral part that is also to communicate with the infrastructure. The potential of active communication should be investigated well first before the deployment potential can be demonstrated and standardized.

- Work out use cases where active communication based on a **chip within a bicycle** can address specific traffic problems as well as business cases (insurance, after-theft recovery, bike-sharing, gamification concepts to support eco-friendly behaviour etc.)

  To support the idea of bike active communication to be accepted by European industry it is necessary to show the potential of such a concept, equipping the bikes with active communication modules, in many areas. There are several potential users of such a concept that are seen now – an example for illustration – public municipalities can plan well investments and constructions of possible cycle ways by capturing data about cyclists movement routes within a city, not just measuring the cyclists at the specified routes (nowadays profile measurement).
  If there are several interrelated use cases confirming the potential of active bike communication it could be an interesting European industry development. After collecting the use cases and justifying the concept for European cities the several pilots and test bed should be supported. The real environment testing can provide valuable information to set up well the requirements and parametres of the concept and prepare the ground for standardization.

- Investigate further the potential of establishing a **new working group for ITS** applications for cyclists to enhance common safecycle solutions to be promoted and financially supported throughout Europe. To issue an official letter with the **results of the project to CEN/TC 278 and ISO/TC 204 secretariat** to gain the official response about the possibility of standardization and establishing a new WG is recommended as a first step.

  The inputs for standardization should be developed along the use cases description as the standardization is a long term process and the administrative (formal) issues take some time. The standardization of active bike communication as well as some of the identified safecycle applications is the corner stone of European cities investments in such concepts to offer citizens as well as tourists to travel by bicycle and other relevant services. To standardize concepts connecting cycling and intelligent transport systems or

traffic safety application could result in a separate working group that could bring experts from many different fields to further develop the potential.
The already established CEN/TC 278 could be the committee that can establish the working group. The aim is to show the interest with the description of the scope of the proposed WG and potential preliminary working items with the working plan. The letter can present the idea and start negotiations with the secretary of CEN/TC 278.

5.3 Recommendations for deployment

Focus on knowledge and information:

- **Increasing knowledge** amongst authorities about the benefits of e-safety applications for bicycles.

  The potential of the e-safety applications described in the SAFECYCLE project is not known enough, particuralry in Eastern Europe, it is necessary to educate local authorities about the benefits of e-safety applications for benefiting bicycles. Good practice studies or evaluation of pilot realisation must be published in a proper way (see next bullet).

- Making the results of impact evaluations of deployment of ICT and ITS applications accessible through **databases like 2DECIDE**.

  It is important for future implementations that road managers know about the best possible solutions and expected impacts of potential ITS solutions. The ITS toolkit of the 2DECIDE project (http://www.its-toolkit.eu/2decide//node/44) is a decision support tool for road managers who want to implement ITS solutions within a specific context (geographical, problem, goal, etc.). Once ITS applications for safer cycling are implemented these should be entered into the tool, so that other/new implementers can learn from the experiences

- **Transfer of experience and know-how.**

  Apart from entering good practices and user experiences in above mentioned ITS toolkit, it is also important to stimulate the cooperation with and between local authorities and application developers. Cooperation between local authorities will result in transfer of experience and know-how on ITS for safe cycling (e.g. the experience of traffic eye in Zurich could also be implemented in similar situations in other cities) and coopeation between local authorities and ITS developers could result in a better understanding of the needs of local authorities and thus development and supply of ITS solutions by the developers/industry which are really needed by road managers. This exchange can be organised at national level through conferences bringing together experts in the field of cycling, ITS and safety, as well as on the European level, e.g. by creating projects aimed at transfer of know-how and experience (e.g. in Horizon 2020, CSA or SA)

- To gain knowledge about the **financial demand and possible turnover** of various stakeholders, and to get insight in tools for co-financing etc.

  Cost benefit analysis can be good basis for future orientation in field of e-safety application. In this aspect costs of apllication are usually relatively easy to evaluate, identification of payer may also not be a problem. Benefits are much more difficult to estimate and the number of benefitors is always higher than payers. F.e. developers, producents and even owners of cars equipped with SaveCap will have no direct benefit from using this product; Ministry of transport will not have direct money from reduction of

accidents and injuries. Transfer of benefits has to be taken into account and cannot create obstacles when deploying the applications.

Focus on Industry:

- Cooperation between **car industry, bicycle manufacturers and ITS companies** for the development and deployment of applications with focus on cyclists.

  Up to now, car manufacturers and ITS companies have developed very few applications aimed at improving the safety of cyclists. As far as developments have taken place, the systems were based on in-car systems without active interaction with bicycles. This is understandable, but this needs to change with the fast growing adoption of both smartphones and electric bicycles. Both developments provide opportunities for cooperative systems between the car and the bicycle.
- Convincing **existing platforms like ERTICO and national ITS organisations** to look with a wider scope than 'just cars' and to focus on cyclists as well.

  Currently ITS providers are very much focussed on applications for cars and trucks. The large-scale testing of cooperative systems does not (or only to a very limited extent) take into account cyclists. However, cyclists are also users of the same infrastructure, and above all, they are vulnerable road users. Therefore this message should be conveyed to major actors like ERTICO, representing the ITS and car industry, and the national ITS organisations (ITS Italy, ITS Austria, etc.). Just like cars and infrastructure, cyclists should be part of the intelligent, cooperative systems.
- Vehicle based safety applications for cyclists should be part of the **euroNCAP system**

  In order to speed-up the adoption of vehicle-based ITS applications that increase the safety of cyclists, proven systems should become part of the euroNCAP classification system for the safety of cars. Euro NCAP Advanced is a reward system launched in 2010 for advanced safety technologies, complementing Euro NCAP's existing star rating scheme. Euro NCAP rewards and recognizes car manufacturers who make available new safety technologies which demonstrate a scientifically proven safety benefit for consumers and society. By rewarding technologies, Euro NCAP provides an incentive to manufacturers to accelerate the standard fitment of important safety equipment across their model ranges. Already the following systems relevant for cyclists have been rewarded:
  - Blind Spot Monitoring
  - Speed Alert Systems (ISA)
  - Autonomous Emergency Braking
  - Attention Assist
  - Vision Enhancement Systems

  This should be updated continuously with new systems entering the market.

Focus on communication:

- To **increase a higher public acceptance.**

  The adoptation of ICT and ITS applications depends also on the willingness of end users to purchase and to actually use them. By bringing stakeholders groups (car industry, bicycle manufacturers en ITS companies) together in a roundtable discussions with end users and cyclists representatives (associations etc.) strategies can be developed to speed up the deployment. Through end-user discussions, information can be gained about the pros and cons of the different applications and possible bariers for active usage can be detected.

- Development of professional **campaigns** with a strategy to succesfully change approaches of various stakeholders and users groups.

  To convince people of the advantages of using ICT and ITS to enhance the safety of as cyclist or to avoid dangerous situations with cyclist, a professional campaign should be developed. The message should fit to opinions of the diffent user groups and the campaign should be adapted to level of cycling in the region and specific attitudes.

5.4 Recommendations for a research agenda

Focus on learning from best practices:

- **Evaluation of best practices** with focus on transferability to other regions and other transportation circumstances.

  The information collected from ministries showed that legislative background differs in European countries and because of that some applications like Bicycle Braking Light, Light Lane Bike cannot be used in some countries.

- Further **comparative research into national frameworks on supportive policies** in cross-cutting SAFECYCLE issues (cycling-ITS-safety) and investigate possibilities for national demonstration projects.

  Cross-cutting topic of the SAFECYCLE project (cycling-ITS-safety) is not covered enough at the national level. Considering different legislative and traffic safety background in European countries demonstration projects are desirable for getting local data.
  To continue with the ICT Policy Support Programme as part of the Competitiveness and Innovation framework Programme, with extension of topics to cycling as well is recommended too..

- Research on **HMI (human machine interface) between a bicyclist and his bicycle**.

  The research should answer the questions what ITS is helping or disturbing the cyclist while riding his bicycles? How, under which conditions and with which requirements?
  Some research was done for motorbikes under the HUMANIST network of excellence (http://www.humanist-vce.eu/)

Focus on the cyclist as part of the cooperative system:

- Cost-benefit analysis of the **incorporation of the cyclists in cooperative systems.**

  With increasing importance of cooperative systems in motor vehicles bicycle can not be forgotten. So far the bicycle is not part of the cooperative systems and can easily be overlooked. A cost-benefit analysis should contribute to an effcitive incorporation of cyclists.

- Realise actions aimed at **fostering cooperation on e-safety applications** for bicycles beyond Europe.

  Many e-safety applications have a potential for a European wide deployment. By fostering cooperation throughout Europe, the effectiveness of the applications can increase as well as the impact. An eCall in case of an accident could be a European wide application and could be combined with for example SaveCap or the invisible helmet in

the collar of the jacket. Inflating the SaveCap airbag or the invisible helmet could be a trigger to eCall.

- Large-scale demonstration and field operational tests focussing on the impact of **individual e-safety applications for cyclists versus hidden applications** that benefit all users passing a certain location.

  A lot of e-safety applications are hidden in infrastructure or vehicles and their functioning doesn't depend on the individual decission of a cyclist or car driver.The possible advantage is a lower amount of applications to be implemented to have a safety effect. By implementing hidden e-safety applications, for example in traffic lights, the safety of all users of those locations increase. In other words: there is a benefit for all users of that location whereas the individual appilications depend on the choice of the user. Field tests should to shed a light on effective strategies and lead to recommendations for road owners and car and bicycle industry.

- Research on **communication between chips in bicycles and the smartphone**, which will allow a multitude of interesting applications.

  Incorporating chips in the bicycle frame allows the development of a wide variety of applications. A chip in the bicycle could be used for detection of trips or specific behaviour like sudden stops or slow driving. In combination with geo-location, this is valuable information for research purposes. It is also possible to think of the smartphone playing a role of a "black-box" in future traffic. What are the options and which ethical issues have to be solved? Till now there is not a standard throughout Europe which makes it not attractive for the bicycle industry to put energy in the development of such a standard chip.

Focus on impact of ICT and ITS on safety of cyclists:

- More research needed in the causes of **bicycle accidents**

  Research on accidents is necessary and extremely important to understand the causal factors. In-depth investigations could be expensive but necessary. Related issue it the possibility of revision the normal national data collection forms in order to collect more detailed information about bicycle accidents. In-depth investigations and harmonisation of accidents data across Europe is necessary too.

- More knowledge is required on the **impact of e-safety applications for cyclists.**

  Specific focus is needed for groups like elderly and young cyclists. Also difference between forerunner regions and starting cycle countries should be addressed or the impact analysis of these applications on other transport modes (for instance pedestrians). The impact analysis also needs of demonstrations and field operational tests (FOT) to understand what can be the real effects. FOTs should be funded in research projects.

- What is the **risk impact for cyclists who are not equipped** with applications of others are? Research answering this question is necessary when assessing safety contribution of each application.

  Using of some applications disadvantage the users who are not equipped, Bicycle Braking Light is an example. These facts has to be considered. We need to understand what could happen if, for instance, many bicycles are equipped with an application. Is the safety improved or are there problems with a large scale implementation?.

Focus on harmonization

- Analysis of **need for harmonization** to speed up deployment

  Research is needed in order to find out to what extent the lack of standards/harmonization is hampering the deployment and use of e-safety applications for cyclists. For example, if harmonization is needed to create a critical mass or mass production, the barriers (and ways to overcome them) to this harmonization need to be research. Furthermore, is it possible that other use of ICT and ITS applications in cycling (e.g. theft protection, bike sharing, smartphones) will speed up the introduction and harmonization of ICT for safety of cyclists?

- Research on **data collection issues**

  It is important to research and identify the kind of data that is needed for development and evaluation of cycling applications, but also the formats and technologies that can/should be used and possible use of existing data sources for road transport. How can best practices in data collection be supported from EU level? Starting point should be the existing statistical databases from Eurostat, CARE and the European Road Safety Observatory and analysis has to start from there.

5.5 Recommendations for transport policies

Beside the White Book on Transport as the main strategic document there are two EU-wide action plans related to SAFECYCLE issue - ITS action plan and Action plan on urban mobility.

The ITS action plan declares that ITS can significantly contribute to a cleaner, safer and more efficient transport system. The goal of it is to create the momentum necessary to speed up market penetration of rather mature ITS applications and services in Europe. ITS action plan was adopted by the European Commission in July 2010.

The Action Plan on urban mobility was adopted by the European Commission in September 2009 and proposes twenty measures to support urban mobility. From SAFECYCLE point of view, Action 20 — Intelligent transport systems (ITS) for urban mobility is relevant.

The Action Plan on urban mobility has to be updated to reflect later ITS action plan. Outputs of the SAFECYCLE project can be one of the source materials for the update as well.

Annex A Literature

Standardisation

CEN ITS standards, available from:
http://www.itsstandards.eu/

CEN/TC 226 Road equipment, available from:
http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx?param=6207&title=Road%20equipment

CEN/TC 278 Road transport and traffic telematics, available from:
http://www.i-mobilitynetwork.com/assets/Library/CEN-TC-278-Brochure-Sep-2011.pdf

CEN/TC 333 Cycles standards, available from:
http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx?param=6314&title=Cycles

CENELEC - European Committee for Electrotechnical Standardization
http://www.cenelec.eu

ETSI TC ITS standards, available from:
http://www.etsi.org/website/technologies/intelligenttransportsystems.aspx

ISO ITS standards, available from:
http://www.iso.org/iso/iso_technical_committee?commid=54706

ISO/TC 149/SC 1 Cycles and major sub-assemblies standards, available from:
http://www.iso.org/iso/standards_development/technical_committees/other_bodies/iso_technical_committee.htm?commid=53034

ISO/TC 204 - ITS - Intelligent Transport Systems, available from:
http://isotc204-publicdocuments.itsa.wikispaces.net/file/detail/JSAE+TC204+Brochure+%282011+Version%29.pdf

Research agenda

CENTRAL EUROPE Programme, available from:
http://www.central2013.eu/

CORDIS, Community Research and Development Information Service, available from:
http://cordis.europa.eu

ECF - European Cyclists' Federation, available from:
http://www.ecf.com

ELTIS, The Urban Mobility Portal, available from:
http://www.eltis.org/

Fietsberaad, Center of expertise on bicycle policy
http://www.fietsberaad.nl

Horizon 2020, The EU Framework Programme for Research and Innovation, available from:
http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=home&video=none

IEE, Intelligen Energy Europe, available from:
http://www.eaci-projects.eu/

SWOV, scientific institute, available from:
http://www.swov.nl/index_uk.aspx

TRIP, Transport Research & Innovation Portal, available from:
http://www.transport-research.info/

Annex B - Development of ISO standard procedure

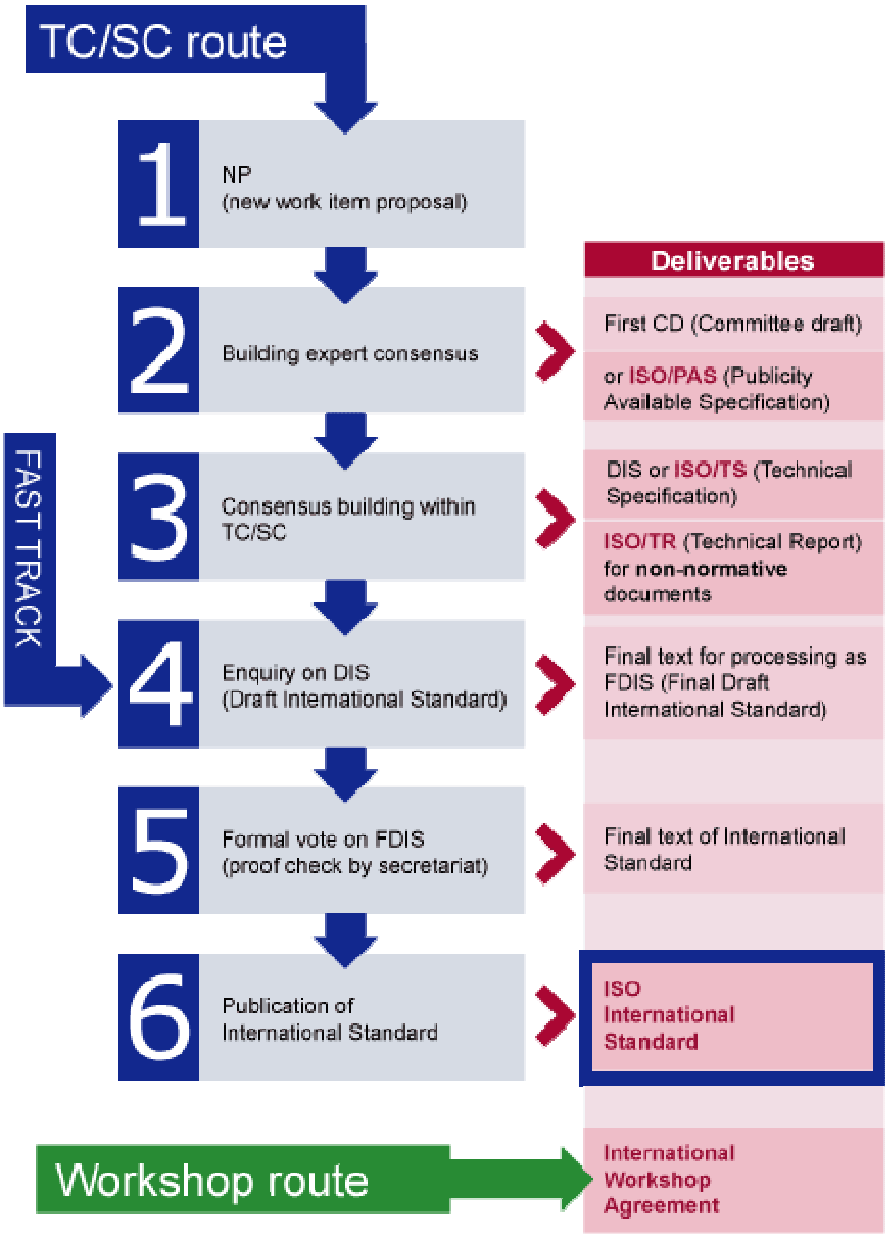

Figure B.1. The procedure to develop an ISO standard

Annex C - Structure and organization of CEN/TC 226 Road equipment

CEN/TC 226 "Road equipment"

Chairman: Philippe LEGER (France)

Secretary: Nathalie GIRARDOT (AFNOR)

CEN/TC 226/WG 1 "Road restraint systems"

Convenor : Jacques BOUSSUGE (France)

CEN/TC 226/WG 2 "Horizontal signs"

Convenor: Emiliano MORENO LOPEZ (Spain)

CEN/TC 226/WG 3 "Vertical signs"

Convenor: Grahame CHEEK (United-Kingdom)

CEN/TC 226/WG 4 "Traffic control"

Dormant

CEN/TC 226/WG 5 "Street lighting"

Convenor: Kai SØRENSEN (Denmark)

CENT/C 226/WG 6 "Noise protection devices"

Convenor: Jean-Pierre CLAIRBOIS (Belgium)

CENT/C 226/WG 10 "Passive safety of support structure for road equipment"

Convenor: Pentti HAUTALA (Finland)

CENT/C 226/WG 11 "Variable message signs"

Convenor: Appeal to candidate in course

Annex D - Structure and organization of CEN/TC 333 Cycles

In the year 1998 the bicycles industry was facing serious barriers since products still needed to be specified according to different national standards. Therefore the development of harmonized European standards for bicycles was of vital importance. In 1998 and under explicit demand of the industry, Technical Committee 333 'Cycles' was created within CEN. COLIBI, COLIPED and ETRA obtained a 'Liaison Status' within the TC 333. Also ECF (European Cyclist Federation) took an active part in the development and study of new European Standards on bicycles.

The main benefits from the publication of ENs standards on bicycles are:

A unique technical reference within Europe in the field of bicycles safety.

Simplification and more efficient procedures to ban the marketing of certain dangerous products or to withdraw products from shops or to recall products that consumers already bought as these standards represent the state of the art in this field and therefore can be used to check the safety level of bicycles on the market.

Manufacturers and distributors are legally obliged to inform the authorities if they realize that a product they supply is dangerous; this might happen i.e. the level of safety is less than that specified in the issued ENs bicycles standards.

Priorities

TC 333 focus its first attention to the study and publication of main bicycles products standards and accessories: EN 14764 City and trekking bicycles, EN 14765 Bicycles for young children, EN 14766 Mountain bicycles, EN 14781 Racing bicycles, EN 14872 Luggage carriers. All standards on bicycles have been issued in the year 2005 and luggage carriers standard has been issued in the year 2006. Most of these standards have been cited in the Official Journal of the European Union under the EC directive 2001/95 “General product safety”. This important recognition from EU legislator gave an added value to the work done by TC 333. There are under development 3 remaining projects: prEN 15532 Terminology, prEN 15496 Cycle lock, prEN 15194 EPAC; all these documents will reach the publication during the year 2007.

The most recent priorities in the work of TC 333 are the creation of a new working group to develop a standard on safety requirements and test methods in the field of BMX-bicycles and the addition to the work programme of a new work item about safety requirements and test methods for double track bicycles trailers.

The structure of the committee is specified in the figure below:

Cycles - Structure

Secretariat	Chairperson	Secretary
UNI	Mr S.Neuberger	Mr G.L.Salerio

SC/WG	Title
CEN/TC 333/WG 6	Terminology
CEN/TC 333/WG 5	Electric power assisted cycles
CEN/TC 333/WG 8	Composite material used in bicycles
CEN/TC 333/WG 7	BMX - bicycles
CEN/TC 333/WG 2	Off road cycles
CEN/TC 333/WG 1	Cycles for common use and bicycle trailers
CEN/TC 333/WG 4	Accessories
CEN/TC 333/WG 3	Racing Bicycles

Table D.1. Structure of CEN/TC 333 Cycles

Annex E - Structure and organization of ISO/TC 149 Cycles and major sub-assemblies

Participating countries: 15

Observing countries: 9

Secretariat:

- Japan (JISC)

Participating Countries

- Brazil (ABNT)
- China (SAC)
- Finland (SFS)
- France (AFNOR)
- Germany (DIN)
- India (BIS)
- Italy (UNI)
- Korea, Republic of (KATS)
- Netherlands (NEN)
- Portugal (IPQ)
- Russian Federation (GOST R)
- Sweden (SIS)
- USA (ANSI)
- United Kingdom (BSI)

TC 149/SC 1/WG 9 Revision ISO 4210 and ISO 8098 (safety requirements)

TC 149/SC 1/WG 10 Lighting and retro-reflective devices

TC 149/SC 1/WG 11 Luggage carriers

TC 149/SC 1/WG 12 Audible warning devices

Annex F - Structure and organization of ISO/TC 204 - ITS - Intelligent Transport Systems

TC 204, a technical committee for standardization for ITS with-in ISO, was set up in 1992 and went into operation the following year. Some of the working groups have been suspended or merged during the years since the inception of TC204, and 14 working groups are currently active. Eight countries serve as lead countries of the working groups. Japan, the U.S. and the United Kingdom take charge of two working groups each. The number of the working items of TC204 is 134 as of January 2011. Up to now as many as 64 international standards from 12 WG's have been established, including the two from WG 14 chaired by Japan in October 2002 which were the first of this kind of ITS international standards from ISO. (refer to the established ISO/TC 204 international standards on P43. The number of international standards does not include PAS, TS and TR) TC 204 has been actively cooperating with some other commit-tees. To take “Data dictionary and message set to facilitate the movement of freight and its intermodal transfer” as an example, it was proposed as a PWI in the TC 204 conference in London in May 2002, approved as a CD in June 2005. Several technical committees have been implementing standardization activities in close contact with each other.

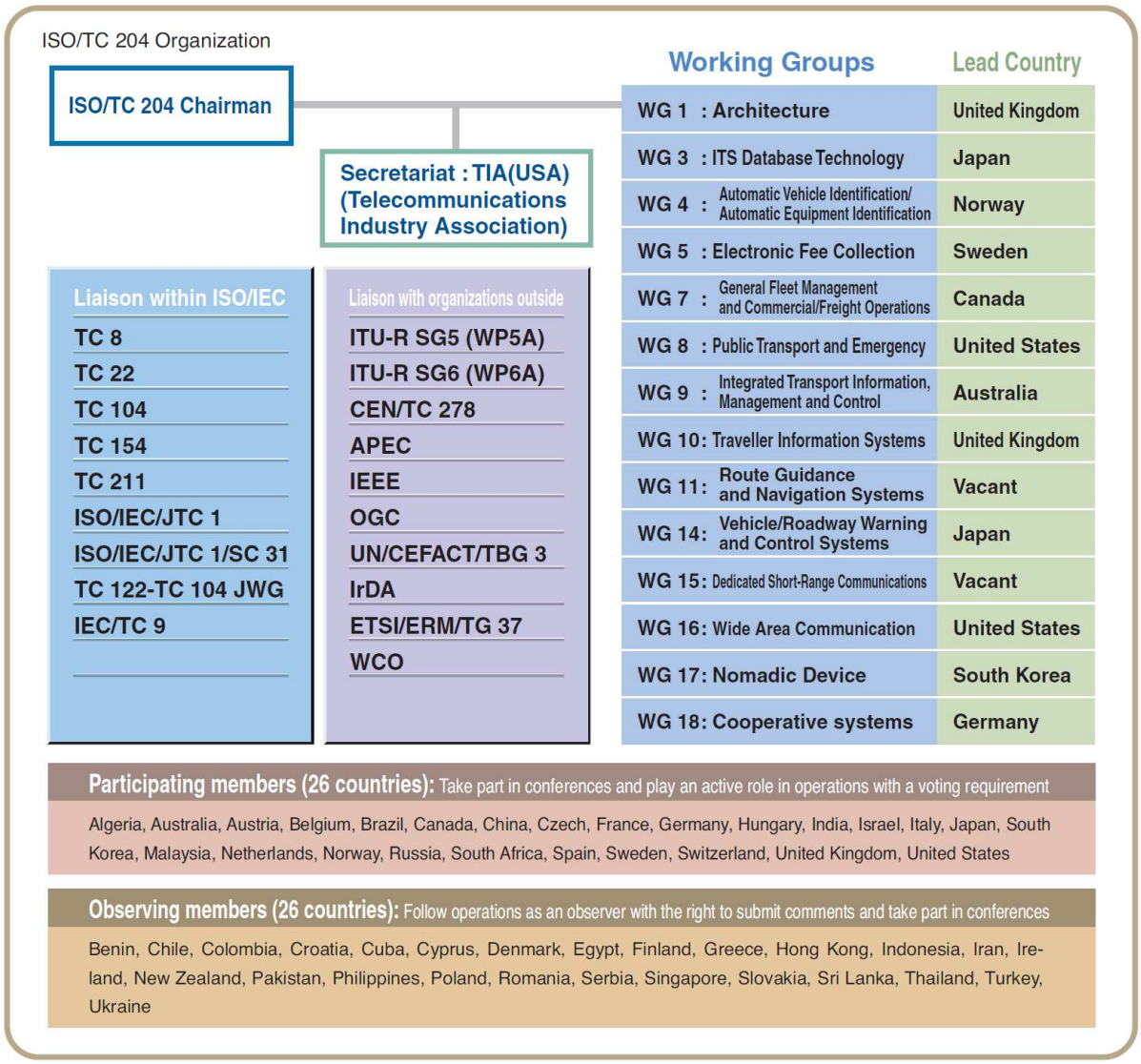

Figure F.1. ISO/TC 204 Organisation

Annex G - Structure and organization of CEN/TC 278 Road transport and traffic telematics

CEN/TC 278 Road transport and traffic telematics is responsible for the development of European standards and technical specifications in the domain of Intelligent Transport Systems (ITS). ITS standards help to ensure interoperability across countries and harmonise technical solutions. The standardization areas include Cooperative systems, Travel and Traffic Information, Route Guidance and Navigation, Public Transport, Emergency vehicles and Electronic Fee Collection.

CEN/TC 278 Factsheet

- Established in 1992
- 31 national members
- 62 active work items, 99 adopted standards
- 11 active working groups with over 300 nominated experts
- Co-operation between market players: industries, service providers, governments
- Well connected to European R&D

Working groups:

- WG 1 Electronic Fee Collection
- WG 2 Freight, Logistics and Commercial Vehicle Operations
- WG 3 Public Transport
- WG 4 Traffic and Travel Information
- WG 5 Traffic Control Systems
- WG 7 Geographic Data Files
- WG 8 Road Traffic Data
- WG 9 Dedicated Short Range Communications
- WG 10 Human-Machine Interfacing
- WG 12 Automatic Vehicle and Equipment Id.
- WG 13 Architecture and Terminology
- WG 14 Recovery of stolen vehicles
- WG 15 eSafety / eCall
- WG 16 Cooperative systems

Annex H – EU Programs

No.	Provider	Program name	Subprogram	Challenge	Web address	Main focus	Goals	Applicants	Year (time period)	Deadline/date
Programs for period 2014 - 2020										
1	European Commission	Horizon 2020	Societal Challenges	Smart, green and integrated transport	http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=home&video=none	ITS, cycling, safety	Horizon 2020 reflects the policy priorities of the Europe 2020 strategy and addresses major concerns shared by citizens in Europe and elsewhere. A challenge-based approach will bring together resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities. This will cover activities from research to market with a new focus on innovation-related activities, such as piloting, demonstration, test-beds, and support for public procurement and market uptake.	Each legal entity	2014 - 2020	2014 - first calls
Programs ending in 2013										
2	European Commission	FP7	Cooperation - Transport	Safe and Seamless Mobility	http://ec.europa.eu/research/participants/portal/page/cooperation?callIdentifier=FP7-SST-2013-RTD-1	ITS, cycling, safety		Each legal entity	Until 2013	14 November 2012, no more calls in FP7, first calls in January 2014 (Horizon 2020)
3	EC - various DG		Cooperation - Transport	The European Green Car initiative	http://www.green-cars-initiative.eu/public/	ITS, cycling, safety	The objective of the initiative is to support R&D on technologies and infrastructures that are essential for achieving breakthroughs in the use of renewable and non-polluting energy sources, safety and traffic fluidity.	Each legal entity	Until 2013	no more calls in FP7, first calls in January 2014 (Horizon 2020)
4	EC - DG CONNECT		Cooperation - ICT	Smart Cities & Sustainability	http://ec.europa.eu/information_society/activities/sustainable_growth/cities/index_en.htm	ICT	Accelerate development and deployment of integrated energy, transport, mobility and ICT solutions at local level to serve EU climate and energy targets and more generally combined social, economic and environmental sustainability, while being the coordination unit for smart cities.	Each legal entity	Until 2013	4 December 2012, no more calls in FP7, first calls in January 2014 (Horizon 2020)
5	EC - DG Energy		Cooperation - Energy	Smart Cities & Communities Initiative	http://ec.europa.eu/energy/technology/initiatives/smart_cities_en.htm	ITS, cycling, safety, ICT	The partnership proposes to pool resources to support the demonstration of energy, transport and information and communication technologies (ICT) in urban areas. The energy, transport and ICT industries are invited to work together with cities to combine their technologies to address cities' needs. This will enable innovative, integrated and efficient technologies to roll out and enter the market more easily, while placing cities at the centre of innovation.	Each legal entity	Until 2013	4 December 2012, no more calls in FP7, first calls in January 2014 (Horizon 2020)
6	EC - DG Energy Competitiveness and Innovation Framework Programme (CIP)	Intelligent Energy Europe	STEER		http://ec.europa.eu/energy/intelligent/	Cycling	Activities funded by the transport strand of the Intelligent Energy Europe programme (STEER) promote a more sustainable use of energy in transport (i.e. increased energy efficiency, new and renewable fuel sources, and the take-up of alternatively propelled vehicles). The specific focus is on alternative vehicle propulsion, policy measures for the more efficient use of energy in transport, and strengthening the knowledge of local management agencies in the transport field.	All applicants must be legal entities, whether public or private, established in the territory of the EU Member States, Norway, Iceland, Liechtenstein, Croatia, or the Former Yugoslav Republic of Macedonia.	Until 2013	The next IEE info day is set on 23 January 2013. Calls in 2013.

No.	Provider	Program name	Subprogram	Challenge	Web address	Main focus	Goals	Applicants	Year (time period)	Deadline/date
7	EC - DG Mobility & Transport	CIVITAS Initiative			http://www.civitas-initiative.org/index.php?id=69	ITS, cycling, safety	The CIVITAS Initiative helps cities across Europe to implement and test innovative and integrated strategies, which address energy, transport and environmental objectives. So far projects in 59 cities have been or are being supported. The annual CIVITAS Forum brings together practitioners and politicians from the CIVITAS cities. Dedicated actions help the wider take up of the CIVITAS results.	Proposals will comprise city-led consortia. Consortia should include both "leading" and "learning" cities with mutually complementary interests. The co-ordinator must be a "leading" city. Each city should be located in a different EU member state or Associated State.		14 November 2012, no more calls in FP7, first calls in January 2014 (Horizon 2020)
8	European Commission	LIFE+			http://ec.europa.eu/environment/life/funding/lifeplus.htm	Cycling	LIFE+ finances schemes that contribute to the development, implementation and updating of Community environmental policy and environmental legislation. This financial instrument also seeks to facilitate the integration of the environment into other policies, and achieve sustainable development in the European Union.	Proposals must be presented by entities registered in the Member States of the European Union being public and/or private bodies, actors and institutions.	Until 2013	14/02/2013 Publication of the call in the Official Journal, 25/06/2013 Deadline for applicants
9	ERDF - European Territorial Cooperation	INTERREG IV C	Energy and sustainable transport		http://www.interreg4c.eu/	Sustainable transport, ITS, cycling	The overall objective of the INTERREG IV Programme is to improve the effectiveness of regional policies and instruments. A project builds on the exchange of experiences among partners who are ideally responsible for the development of their local and regional policies. It aims to promote common solutions for neighbouring authorities in the fields of urban, rural and coastal development, the development of economic relations and the creation of networks of small and medium-sized enterprises (SMEs).	Public authorities and bodies governed by public law.	Until 2013	No more calls
10	ERDF	URBACT II PROGRAMME			http://urbact.eu/	ITS, cycling	The overall objective of URBACT II is to improve the effectiveness of sustainable integrated urban development policies in Europe with a view to implementing the Lisbon-Gothenburg Strategy. The programme has two priorities: 1) Cities, Engines of Growth and Jobs & 2) Attractive and cohesive cities which offer scope for transport related projects.		Until 2013	No more calls
11	EC - DG Move	Trans-European Transport Networks TEN-T			http://tentea.ec.europa.eu/en/apply_for_funding/follow_the_funding_process/calls_for_proposals_2009.htm	ITS	The TENs aim to integrate national networks, link peripheral regions of the Union to the centre, integrate transport modes (intermodality), improve safety and efficiency of the networks.	Only written applications submitted by legal persons of private or public law legally constituted and registered in a Member State are eligible for Union financial support.	Until 2013	2013

Table H.1. EU Research programs

Annex I – Research agenda – list of research projects

Research agenda with detailed projects description can be found on the webpage www.safecycle.eu.

No	Project name	Start and end date	Focus	Web page / source
1	**2DECIDE - Toolkit for sustainable decision making in ITS deployment**	10/2009 - 09/2011	ITS/ICT	http://www.2decide.eu
2	**Advanced Cruise Control (ACC)**	December 2010	ITS/ICT	http://www.swov.nl/rapport/Factsheets/UK/FS_ACC_UK.pdf
3	**Analysis of variables influencing cycling accidents: development of models and design of an assistance tool**	2007	Cycle	http://www.ayesa.es/en/index.php/idi/ficha_proyecto/accibici_pt-2007-055-21caem/
4	**ASSESS - Assessment of integrated vehicle safety systems for improved vehicle safety**	July 2009 - December 2012	ITS/ICT	http://www.humanetics.eu/
5	**ASTUTE - Advancing Sustainable Transport in Urban Areas To Promote Energy Efficiency**	From 02-2006 to 02-2009	Cycle	http://www.astute-eu.org/
6	**Barclays Cycle Superhighways**	July 2010 - 2015	Cycle	http://www.tfl.gov.uk/roadusers/cycling/11901.aspx
7	**BESIDIDO - Research into improving road traffic safety by means of transport engineering and organisational monitoring**	March 2001 - December 2005	ITS/ICT	http://www.transport-research.info/web/projects/project_details.cfm?id=7653
8	**BiciBus**	Since 2003	Cycle	http://www.epomm.eu/study_sheet.phtml?sprache=en&study_id=3129
9	**BICY – Cities & Regions of Bicycles**	February 2010 - January 2013	Cycle	http://www.bicy.it/
10	**Bicycle Dynamics**	Since 2002	Cycle	http://bicycle.tudelft.nl/schwab/Bicycle/
11	**Bicycle facilities on distributor roads**	December 2010	Cycle	http://www.swov.nl/rapport/Factsheets/UK/FS_Bicycle_facilities.pdf
12	**Bicycle facilities on distributor roads**	December 2010	Cycle	http://www.swov.nl/rapport/Factsheets/UK/FS_Bicycle_facilities.pdf
13	**Bicycle helmets**	September 2012	Cycle	http://www.swov.nl/rapport/Factsheets/UK/FS_Bicycle_helmets.pdf
14	**Bicycle paths and bicycle lanes**	2008	Cycle	http://www.fietsberaad.nl/library/repository/bestanden/Bicycle%20paths%20and%20bicycle%20lanes.pdf
15	**Bicycle traffic in junctions**	26.09.2011 - 30.09.2013	Cycle	http://www.aramis.admin.ch/Default.aspx?page=Grunddaten&ProjectID=29180
16	**Bicycles in Luxembourg**	January - December 1990	Cycle	http://cordis.europa.eu/home_en.html
17	**Bike Experience - changing motorists into cyclists**	Since 2010	Cycle	http://www.bikeexperience.be
18	**B-TRACK-B**	01/06/2012 - 31/12/2015	Cycle	http://www.ecf.com/projects/b-track-b/
19	**BYPAD Platform - Further implementation and improvement of cycling audits in EU cities and regions, training of certified auditors and continuous exchange of**	January 2006 - September 2008	Cycle	http://bypad.org/

No	Project name	Start and end date	Focus	Web page / source
	knowledge on cycling policy			
20	**CARSENSE - Sensing of Car Environment at Low Speed Driving**	From 2000-01-01 to 2002-12-31	ITS/ICT	http://www.carsense.org
21	**Central MeetBike**	March 2011 - February 2014	Cycle	http://www.centralmeetbike.eu/
22	**Cities fit for Cycling: The Times campaign**	Since 02/2012	Cycle	http://www.thetimes.co.uk/tto/public/cyclesafety/
23	**Cities for Cyclists**	Since 2010	Cycle	ecf.com/cities-for-cyclists
24	**Communication and mobility behaviour – a trend and panel analysis of the correlation between mobile phone use and mobility**	March 2009	ITS/ICT	http://www.sciencedirect.com/science/article/pii/S0966692308001336
25	**Commuting by bike in Belgium, the costs of minor accidents**	November 2010	Cycle	http://www.sciencedirect.com/science/article/pii/S000145751000196X
26	**CONDUITS - Coordination of network descriptors for urban intelligent transportation systems**	May 2009 - April 2011	ITS/ICT	http://www.isis-it.com/
27	**CONNECT - Co-ordination and stimulation of innovative ITS activities in Central and Eastern European Countries**	May 2004 - March 2009	ITS/ICT	http://www.connect-project.org/
28	**Cost-benefit analysis of road safety measures**	December 2011	Safety	http://www.swov.nl/rapport/Factsheets/UK/FS_CBA.pdf
29	**Creation of a European network of bike-sharing to facilitate travel between cities with low CO2 emissions**	Assessing project duration: 36 months	ITS/ICT	http://www.central2013.eu/nc/about-central/central-europe-community/project-idea-database/project-name/creation-of-a-european-network-of-bike-sharing-to-facilitate-travel-between-cities-with-low-co2-emi/
30	**Crossing facilities for cyclists and pedestrians**	March 2010	Cycle	http://www.swov.nl/rapport/Factsheets/UK/FS_Crossing_facilities.pdf
31	**CyCity**	2010-01-01 - 2013-12-31	Cycle/ITS	http://www.cycity.se/eng/index.php
32	**Cycle networks in Cyprus towns**	From 1998-02-01 to 2001-01-31	Cycle	http://www.eukn.org/Cyprus/cy_en/E_library/Transport_Infrastructure/Roads_Road_Transport/Cycle_Routes/Cycle_networks_in_Cyprus_towns
33	**CYCLElogistics**	April 2011 – March 2014	Cycle	http://cyclelogistics.eu
34	**Cyclists**	July 2009	Cycle/ITS	http://www.swov.nl/rapport/Factsheets/UK/FS_Cyclists.pdf
35	**CYRANO**	Assessing project duration: 36 months	Cycle	http://www.central2013.eu/nc/about-central/central-europe-community/project-idea-database/project-name/cyrano/
36	**Determinants of bicycle use: do municipal policies matter?**	August 2004	Cycle	http://www.sciencedirect.com/science/article/pii/S0965856404000382

No	Project name	Start and end date	Focus	Web page / source
37	**Differences in bicycle use can be easily explained**	January 2005	Cycle	http://www.fietsberaad.nl/library/repository/bestanden/Differences%20in%20bicycle%20use%20can%20be%20easily%20explained%20.doc
38	**Drivers overtaking bicyclists: Objective data on the effects of riding position, helmet use, vehicle type and apparent gender**	March 2007	Cycle	http://www.sciencedirect.com/science/article/pii/S0001457506001540
39	**Effects of a robust roads network on bicycle traffic.**	March 2012	Cycle	http://www.swov.nl/rapport/R-2012-03.pdf
40	**E-mobility in Central Europe**	Assessing project duration: 36 months	Cycle	http://www.central2013.eu/nc/about-central/central-europe-community/project-idea-database/project-name/e-mobility-in-central-europe/
41	**E-mobility in Germany: White hope for a sustainable development or Fig leaf for particular interests?**	November 2012	ITS/ICT	http://www.sciencedirect.com/science/article/pii/S1462901112001839
42	**Energy impacts of ICT – Insights from an everyday life perspective**	November 2012	ITS/ICT	http://www.sciencedirect.com/science/article/pii/S0736585312000184
43	**eSafety Support - Supporting the European effort on eSafety and sustaining the work of the eSafety Forum activities**	January 2006 - December 2008	ITS/ICT	http://www.transport-research.info/web/projects/project_details.cfm?id=11331
44	**E-TOUR - Electric Two-Wheelers on Urban Roads**	From 2000-01-01 to 2002-12-31	Cycle	http://www.ikaoe.unibe.ch/forschung/e-tour/
45	**Ex-ante assessment of the safety effects of intelligent transport systems**	July 2010	ITS/ICT	http://www.sciencedirect.com/science/article/pii/S000145751000062X
46	**Facts about cycling in the Netherlands**	January 2001	Cycle	http://www.fietsberaad.nl/library/repository/bestanden/document000095.pdf
47	**From bicycle crashes to measures: knowledge and knowledge gaps**	August 2012	Cycle	http://www.swov.nl/rapport/R-2012-08.pdf
48	**How does a modal shift from short car trips to cycling affect road safety?**	October 2012	Cycle	http://www.sciencedirect.com/science/article/pii/S0001457512003119
49	**How to make more cycling good for road safety?**	January 2012	Cycle	http://www.sciencedirect.com/science/article/pii/S0001457510003416
50	**CHAMP - Cycling Hearoes Andvancing sustainable Mobility Practice**	October 2011 - September 2014	Cycle	http://www.champ-cycling.eu/
51	**I love velo – Romania's first bike sharing scheme**	Launched March 2010	Cycle	http://www.ivelo.ro/
52	**ICT 2020 Research for Innovations**	2007	ITS/ICT	http://www.bmbf.de/pub/ict_2020.pdf
53	**Instant Mobility - Future Internet for Smart, Efficient & Green Mobility**	April 2011 - March 2013	ITS/ICT	http://instant-mobility.org
54	**Integrated mobility for better life quality in urban areas**	From 1994-07-01 to 1995-12-31	Cycle	http://cordis.europa.eu/home_en.html
55	**ISABELLE - Integrated SAfety Benefit Estimation tooL for 2-wheeLErs**	From 2012-01-01 to 2015-12-31	Cycle	http://www.certh.gr/

No	Project name	Start and end date	Focus	Web page / source
56	**LIFE CYCLE**	June 2008 - May 2011	Cycle	http://www.lifecycle.cc/
57	**Little known about anti-congestion role of bicycles**	-	Cycle	http://www.fietsberaad.nl/library/repository/bestanden/Little%20known%20about%20anti-congestion%20role%20of%20bicycles%20.doc
58	**Mobile 2020**	May 2011 - April 2014	Cycle	http://www.mobile2020.eu/
59	**National bicycle policies in Europe**	2004	Cycle	http://www.fietsberaad.nl/library/repository/bestanden/document000088.pdf
60	**NAVIKI - Energy Efficiency through Web 2.0 Bicycle Navigation and Communication**	01/05/2011 - 01/01/2014	Cycle, ITS/ICT	http://www.naviki.org/
61	**OBIS - Optimising Bike Sharing in European Cities**	01/09/2008 - 31/08/2011	Cycle	http://www.obisproject.com/
62	**Optimising cycle path proposals**	2007-2013	Cycle	http://www.fd.cvut.cz/veda-a-vyzkum/vyzkumne-zamery.html
63	**PRESTO - Promoting cycling for everyone as daily transport mode**	01/05/2009 - 31/01/2012	Cycle	http://www.presto-cycling.eu
64	**PRO-BICI - Planning methodologies and management strategies for the promotion of bicycle use**	01/2008 - 12/2009	Cycle	-
65	**Promoting bicycle use: consequences for traffic safety**	May 2006	Cycle	http://www.fietsberaad.nl/library/repository/bestanden/Promoting%20bicycle%20use%20consequences%20for%20traffic%20safety.pdf
66	**Promoting bike-and-ride: The Dutch experience**	May 2007	Cycle	http://www.sciencedirect.com/science/article/pii/S096585640600111X
67	**Protective bicycle lanes outside built-up areas**	10.02.2004 - 31.08.2007	Cycle	http://www.aramis.admin.ch/Default.aspx?page=Grunddaten&ProjectID=2329
68	**Road crash costs**	December 2011	Safety	http://www.swov.nl/rapport/Factsheets/UK/FS_Costs.pdf
69	**Road factors and bicycle–motor vehicle crashes at unsignalized priority intersections**	May 2011	Cycle	http://www.sciencedirect.com/science/article/pii/S0001457510003350
70	**SAFEWAY - A Safe Way to School on Foot and Bike - Traffic and Children in Europe**	January 1993 - June 1993	ITS/ICT	http://cordis.europa.eu/home_en.html
71	**SHAPES - Systematic analysis of Health risks and physical Activity associated with cycling Policies**	2007 - 2011	Cycle	http://www.shapes-ssd.be/
72	**SMOOTH - Safety and Mobility Optimisation for sustainable Transport and Health**	December 2009 - November 2012	Cycle	http://www.smooth-project.eu
73	**SOL - Save Our Lives. A Comprehensive Road Safety Strategy for Central Europe**	April 2010 - March 2013	ITS/ICT	http://www.sol-project.eu/
74	**SPEED BIKE - Saving Power and Environment by Electromuscular Diffusion**	January 1998 - January 2000	Cycle	http://cordis.europa.eu/home_en.html
75	**SPICYCLES - Sustainable Planning & Innovation for biCYCLES**	January 2006 - December 2008	Cycle	http://spicycles.velo.info/

No	Project name	Start and end date	Focus	Web page / source
76	**SUNSET - Sustainable social networking services for transport**	February 2011 - February 2014	ITS/ICT	http://sunset-project.eu
77	**T.aT. Project - Sustainable mobility experiences in the universities of Chieti (Italy), Aglantzia (Cyprus) and Leiria (Portugal)**	15/10/2007 - 14/04/2010	Cycle	http://www.tat-project.eu/index.php
78	**TELLUS - Transport & environment alliance for urban sustainability**	From 2006-12-19 to 2018-12-18	Cycle	http://cordis.europa.eu/home_en.html
79	**The development of a nondestructive and predictive test method for the fatigue behaviour of bicycle safety parts**	December 1999 - June 2000	ITS/ICT	http://cordis.europa.eu/home_en.html
80	**The elderly and Intelligent Transport Systems (ITS)**	December 2010	ITS/ICT	http://www.swov.nl/rapport/Factsheets/UK/FS_Elderly_and_ITS.pdf

Table I.1. Research agenda – list of research projects

Annex J – Outputs from final conference of SAFECYCLE project in Vienna

25th October, the final conference of SAFECYLCE project took place in Vienna. The date and location was chosen with regards to ITS World Congress. It was the assumption of the SAFECYCLE project team that ITS experts from the ITS World Congress would take part in the SAFECYCLE conference. This idea was right and 29 experts on ITS, safety and/or cycling visited the event.

Important part of the conference was interactive work in groups of 4 – 5 people and discussion upon 25 applications which were assessed within WP3 – impact assessment.

8 groups were created and asked to rank the applications into 3 groups according to the chance on implementation of the application: perspective, not sure, useless (see figure J.1.)

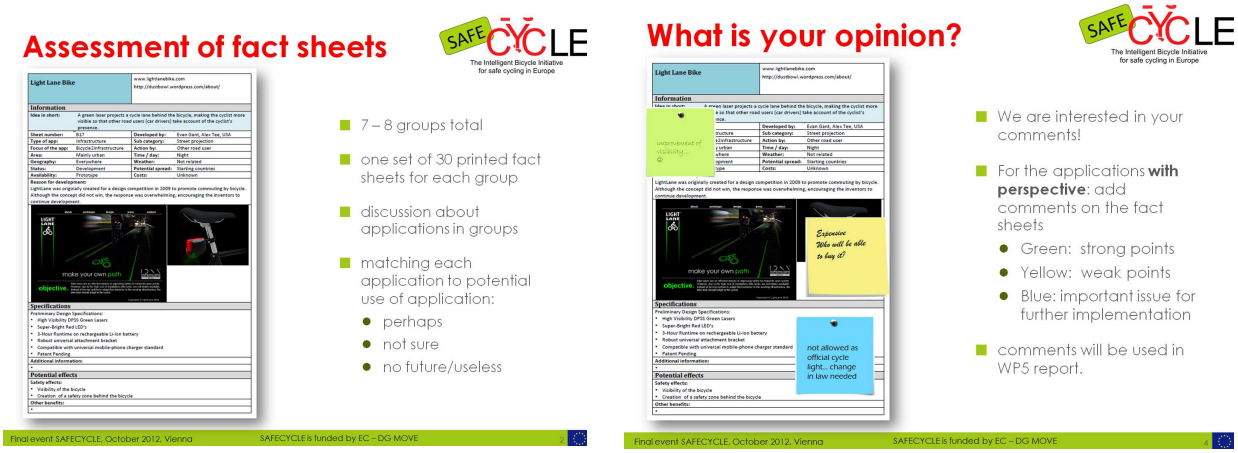

Figure J.1. Ranking 25 applications: asking for the opinion of the participants

Ranking the applications

Figure J.2. shows the results of the ranking of the applications. It is a summary of the ranking of the 8 groups.

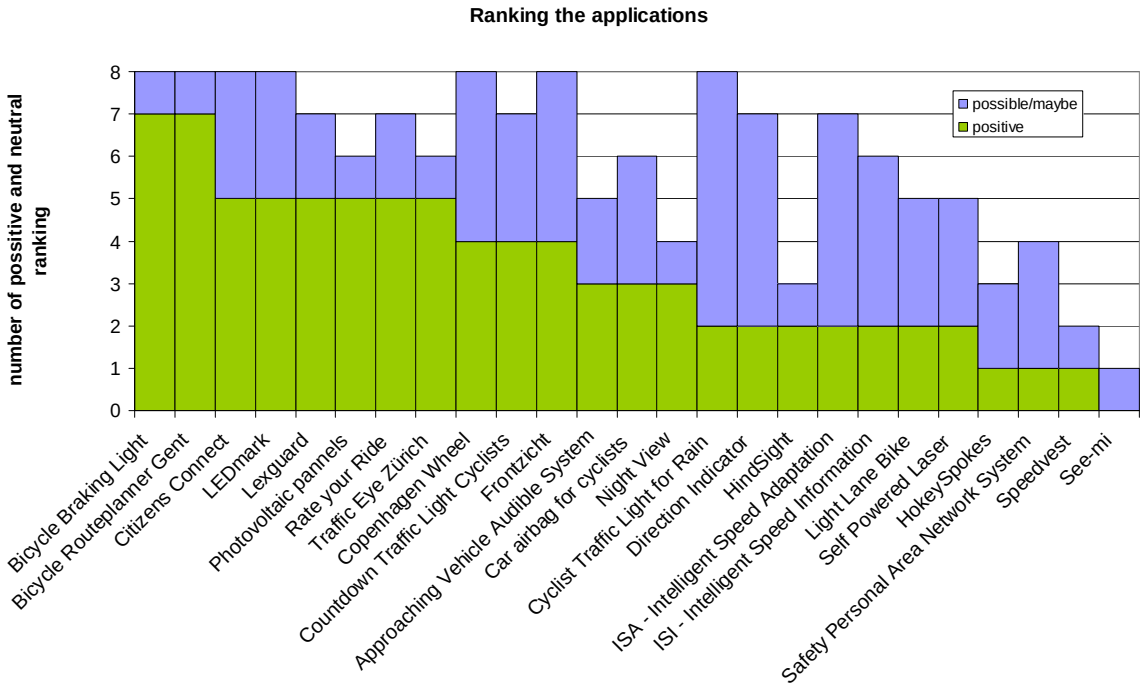

Figure J.2. Ranking 25 applications, results of discussion in groups.

Top ranked applications are Bicycle Braking Light and Bicycle Routeplanner Gent with 7 positives ratings and 1 “maybe” rating. Also LEDmark, Citizens Connect scored very high followed by Lexguard and Rate your Ride applications. Traffic Eye Zürich and Photovoltaic panels were also rated positively.

On the contrary See-mi, Speedvest, HokeySpokes and Hind Sight were at the bottom of the set.

Recommendations

While discussing in groups, the conference participants were also asked to write their comments on a sticker and put them on the fact sheet of the application. Comments were in 3 categories - strong, weak and important issue for further implementation. An overview of all notes is shown in the following figure.

no.	application	strong point		weak point			issue for further implementation			
1	Approaching Vehicle Audible System			should make noise inside the car	extra noise	electric veh. = low penetration in absolute numbers	should adapt to environment noise level	investment for car users, possible part of safety package	cheaper solution - silent horn	uniformity for car manufacturers
2	Bicycle Braking Light	helps cyclist - cyclist safety	low cost, high effect expected				changing intensity of lights - more visibility	battery problems	if not working - very dangerous, reliability	
3	Bicycle Routeplanner Gent	not direct safety benefit					standardisation required, one product for country	safety - highest pre-trip impact		
4	Car airbag for cyclists			market penetration - long term issue	expensive to manufacture	not sure about the effect of triggering	too expensive			
5	Citizens Connect	good for crowd - sourcing safety problems					should be promoted to other city life areas (waste reporting, not only traffic)	usable for behavioural change	how to keep it in the centre of attention? owner obliged to respond?	management of expectation
6	Copenhagen Wheel			unsure safety benefits	investment costs	low penetration	should be green, standardised	data collection (creation), sharing information	platform for all kinds of use, could be made obligated	
7	Countdown Traffic Light Cyclists			unsure safety benefits		appeals to understanding - you know you are detected	cyclists are pretty safe about intersections	hard to use with sophisticated traffic lights		
8	Cyclist Traffic Light for Rain			unsure safety benefits	depend on how often comes the rain suddenly (on-trip - useful, pre-trip - will I travel?)		not for safety, for comfort			
9	Direction indicator			inappropriate, too much technology	good at night	not obligatory	legal issues			
10	Frontzicht			for mixed traffic flows only						
11	HindSight			mirror is ok	hard to read it while moving					
12	HokeySpokes			takes attention from cyclists who don't have it	attractive mainly for teenagers and children		simple reflection tools are ok			
13	ISA - Intelligent Speed Adaptation			could be nice to identify cyclist also behind the corner "car 2 bike"			is it controlled by the arm?			
14	ISI - Intelligent Speed Information						those drivers who will to add this are already driving well			
15	LEDmark	good especially if problems with verge recognition		costs						

no.	application	strong point		weak point			issue for further implementation			
16	Lexguard	low cost compared to cost of truck		costs	form mainly mixed traffic flows	should be compulsory	must work reliable			
17	Light Lane Bike	should be a bright light	all should have it or none							
18	Night View	personal decision	perspective, many accidents at rain/poor visibility							
19	Photovoltaic panels			investment to infrastructure needed	very future concept		single sided accidents			
20	Rate your Ride	good for crowd - sourcing safety problems		dangerous for safety due to distraction of a rider			not direct related to safety			
21	Safety Personal Area Network System			might result in bad behaviour of drivers	DSRC comm. modules to equip the infrastructure (not common at East)	communication costs				
22	See-mi			infrastructure deployment (investments)	special reflector purchase - low penetration	affect the involved people only				
23	Self Powered Laser			what if some have it and some not	who is going to invest to special vest?					
24	Speedvest			what about oncoming bikes?	safety value?		useless			
25	Traffic Eye Zürich	great for Vienna					should be standardised			

Table J.1. Comments on the applications

Comparison of data

An interesting challenge was to compare the ranking of the ministries (see chapter 4) and the ranking of the final conference participants, although it is hard to compare both rankings due to differences in the ´quality´ of data. The participants of the conference had 30 minutes for going through 25 factsheets and discussing them, as only the 11 applications that had been selected for the impact assessment were offered to the ministries. To make the outcomes comparable, it was necessary to work with the same scale: ministries ranked applications from 1 (the worse) to 5 (the best), as the output of the conference was just a ranking of positive or maybe from 8 groups.

The results from the Vienna final conference were transformed to the scale of the results of the ministries. For better compatibility of data there was a need to transform “maybe/not sure“ answers to “positive“ answers. It was assumed, that:

2 “maybe/not sure“ answers = “positive“ answer

Next step was to transform the scale – from 0 to 8 of possible positive ranking to 1 – 5 of ranking of ministries. This formula for data conversion was used:

$R_{conference} = R_{ministries} /8*4+1$

where:

$R_{conference}$ = ranking of the application made by conference participants (average value)
$R_{ministries}$ = ranking of the application made by ministries (average value)

Following figure is the result of comparison.

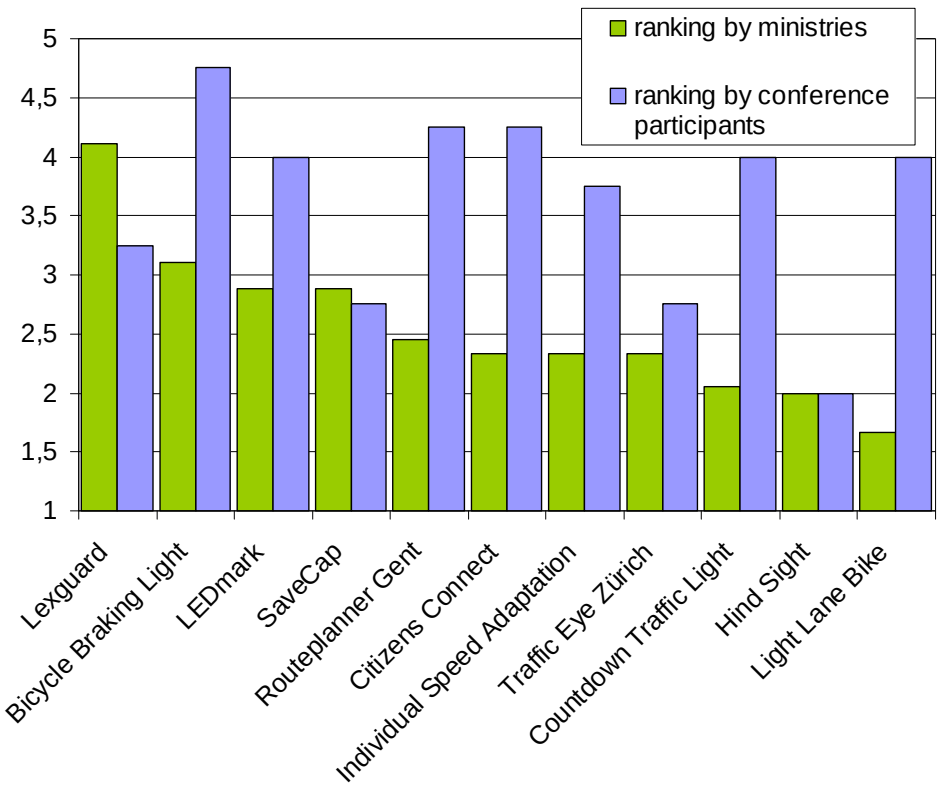

Figure J.3. Comparison of the results of ranking between ministries and participants of the final conference. 5 = most interesting application, 1 = useless application.

Looking at the figure, conference participants were obviously more optimistic with applications; most of applications obtained much better scores than from ministries. As the participants of the conference were from different countries and probably did not have detailed data about accidents available, their responses were more oriented to the future and progress of the application based on feeling than to the lowering actual accidents numbers.

So their view to the application was from a different angle than ministries view. The greatest difference is seen in case of Bicycle Braking Light. Responses from ministries stated that it could prevent only very little amount of accidents and in addition in Spain this application is not legal. The conference participants prioritized this application very high, which can be explained as the will for on-going attention for cyclists and this application has (under some circumstances like obligatory for all) evident potential for the future.