



**SafetyCube DSS** [www.roadsafety-dss.eu](http://www.roadsafety-dss.eu)  
the European Road Safety Decision Support System  
[www.roadsafety-dss.eu](http://www.roadsafety-dss.eu)

# The Future Decision Support System

**Deliverable 8.5**



# Business plan for the future Decision Support System

## Work Package 8, Deliverable 8.5

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**Thomas P, Filtness A. (Eds) (2018), The future Decision Support System, Deliverable 8.5 of the H2020 project SafetyCube.**

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# Executive Summary

The European Road Safety Decision Support System (DSS) is a **comprehensive** “one stop shop” designed to inform evidence based policy by providing state of the art scientific knowledge on road safety. A short promotion video is available here: [www.youtube.com/watch?v=Y-mVUde3knU](https://www.youtube.com/watch?v=Y-mVUde3knU). The DSS ([www.roadsafety-dss.eu](http://www.roadsafety-dss.eu)) has a **user friendly** web-based interface allowing users access to compressive information about a large range of road safety risk (problems) and measures (solutions), and links between the two. In addition, users are presented with information about serious road injuries, accident scenario fact sheets and an Economic Efficiency Evaluation (E<sup>3</sup>) tool. The E<sup>3</sup> tool allows users to evaluate the cost effectiveness of road safety measures as well as providing a selection of worked examples.

The European Road Safety DSS was developed by the European Commission supported Horizon 2020 project **Safety CaUsation, Benefits and Efficiency (SafetyCube)**. The object of SafetyCube was to develop an innovative **road safety Decision Support System (DSS)** that will enable policy-makers and stakeholders to select and implement the most appropriate strategies, measures and cost-effective approaches to reduce casualties of all road user types and all severities. Detailed information about the development and DSS status at the end of the SafetyCube project are available in Yannis & Papadimitriou (2018). An overview of the DSS scientific content and a summary of the methodology used to develop the DSS can be found in the SafetyCube Final Project Report (Thomas & Talbot, 2018). The present Deliverable (8.5) gives a brief overview of the current state of the art DSS, describes the future enhanced version of the DSS and provides information for potential funder(s). **Opportunity is available for new funders to support the European road safety DSS as it is developed and enhanced for future users.** Through supporting the DSS, the future funder(s) will be contributing the Global UN Sustainable Development Goals on road safety by taking a leading position to actively promote effective solutions to road safety's most pressing challenges.

Aspirations for the future DSS will make the scientific content **more accessible** through translation of content in to local languages and filtering information into the manner most appropriate for low and middle income countries. The content will be expanded to include **more topics and more detail about existing topics**. Expansion of knowledge will include knowledge about **implementing measures** and a focus on the interdependences of road safety measures considering the impacts of **implementing measures in combination**. In addition to the future visions for content there are also aspirations for the future web based interface. A key enhancement will be to give users the **ability to customise** the display and select the information they would like to see for each individual coded study.

The best case future for DSS operation is that of extended growth supported by considerable external funding. The exact structure, legal entity and governance of the future enhanced DSS will be decided in collaboration between the SafetyCube consortia and the future funder(s). In this cooperative way **funding partners will have the chance to influence the development process in the manner most appropriate to meet their stakeholder needs**. It is envisaged that the future DSS will be financed by several Organisations, therefore, the governance, time schedule and strategy for extended growth will be mutually decided. Within the SafetyCube project activities have been undertaken to advertise the DSS and provide information for potential funders.

The European road safety DSS is **the first integrated road safety support system developed in Europe**. It aims to be the “go to tool” for road safety knowledge. The next funder(s) of the DSS have the exciting opportunity to take the DSS to the next level in facilitating the future of evidence based road safety policy making, ensuring safe roads for all.

# 1 Introduction



This chapter describes the project and purpose of the deliverable. A short description of SafetyCube WP8 is also provided.

## 1.1 BACKGROUND

Safety CaUsation, Benefits and Efficiency (SafetyCube) is a European Commission supported Horizon 2020 project with the objective of **developing an innovative road safety Decision Support System (DSS)** that will enable policy-makers and stakeholders to select and implement the most appropriate strategies, measures and cost-effective approaches to reduce casualties of all road user types and all severities. SafetyCube aims to:

1. develop new analysis methods for (a) Priority setting, (b) Evaluating the effectiveness of measures (c) Monitoring serious injuries and assessing their socio-economic costs (d) Cost-benefit analysis taking account of human and material costs
2. apply these methods to safety data to identify the key accident causation mechanisms, risk factors and the most cost-effective measures for fatally and seriously injured casualties
3. develop an operational framework to ensure the project facilities can be accessed and updated beyond the completion of SafetyCube
4. enhance the European Road Safety Observatory and work with road safety stakeholders to ensure the results of the project can be implemented as widely as possible

The core of the project is a **comprehensive analysis of accident risks and the effectiveness and cost-benefit of safety measures focusing on road users, infrastructure, vehicles and injuries framed within a systems approach** with road safety stakeholders at the national level, EU and beyond having involvement at all stages.

### 1.1.1 SafetyCube WP8

The objectives of SafetyCube WP8 are:

- to set up **the European Decision Support System (DSS)** for supporting evidence-based policy making;
- to co-ordinate the analyses undertaken in WP 4 – 7 and ensure that the research outcomes integrate road user, vehicle and infrastructure factors, that the evaluation of risks and measures are comprehensively handled between WP 4 – 7, and that the results of the “hot topics” analyses are properly integrated;
- to compile the project outputs into a suitable form to be incorporated within the DSS and the European Road Safety Observatory;
- to develop the structure, operational procedures and business plan to enable the DSS to continue to support evidence based road safety policies beyond SafetyCube.

## 1.2 PURPOSE AND STRUCTURE OF THIS DELIVERABLE

This report describes the activity and outputs of SafetyCube Task 8.5 - '**Business plan for the future implementation of Decision Support System**'.

It is intended that the SafetyCube DSS will remain in operation for long time after the end of the project and it will be gradually become a reference Information System, in which more and more road safety experts and organisations contribute their studies with quantitative results, using the SafetyCube protocol. Within Task 8.5, a business plan has been developed to define future aspirations for the decision support system (DSS) in order that the DSS become a service for safety assessment and evaluations. The objective of this report is to outline the highest aspiration for the continuation of the operation of the SafetyCube DSS after the end of the SafetyCube project and the respective period covered by the European Commission financing (30 April 2018).

This report is structured as follows:

**Chapter 2** presents the current state of the art of the DSS. **Chapter 3** outlines the vision for DSS operation after the project. **Chapter 4** provides information for potential funders. The report is concluded in **Chapter 5**.



## 2 State of the art DSS



This Chapter outlines the DSS as developed within the time frame of the SafetyCube project (May 2015-April 2018)

### 2.1 CURRENT STATUS OF THE DSS

The European road safety DSS is available online at [www.roadsafety-dss.eu](http://www.roadsafety-dss.eu). It is structured around two main pillars: risk factors and road safety measures. Within each there are three operational levels: Level 1: Search Pages; Level 2: Results Pages; and Level 3: Individual study pages. These are reachable through five entry points (keywords, risk factors, measures, road user groups, accident categories).

Level 1 consists of the specific search options available to users. These are based on the **five entry points**. The philosophy of this search is as follows:

- **Keyword search:** search on the basis of keywords retrieve through the SafetyCube list of master keywords, numbering more than 500 terms (each one of them linked to one or more of the thousands of keywords of the coded studies).
- **Risk factors:** search for a crash risk factor through the SafetyCube taxonomy
- **Measures:** search for a road safety measure through the SafetyCube taxonomy
- **Road user groups:** search for the risks and measures concerning particular road user group.
- **Accident categories:** search for risks or measures related to a specific accident category.

In the **DSS results pages (Level 2)**, the user has numerous options: to refine the search through a set of filters (e.g. country, road user type, road type, more specific topic), to download the synopses available, to browse the related risks / measures, or to select one of the individual studies available for the topic. In the **individual study pages (Level 3)**, the abstract and source of each study are provided, together with information on the design and sampling used, the estimates provided, their confidence intervals and the statistical significance. Links to the full text are also provided, depending on the access rights of each user.

As of April 2018 the DSS includes the following:

Taxonomy, risk factors and measures:

- **4 areas:** road user, infrastructure, vehicle, post impact care
- **88 risk factors and measures** (38 risk factors, 50 measures) e.g. distraction, roadside, crashworthiness.
- **313 specific risk factors and measures** (120 risk factors, 193 measures) e.g. mobile phone use, no clear-zone, low pedestrian rating (NCAP)

Contents and outputs:

- **1301 studies** (out of which more than 90 meta-analyses) including more than 7500 effects of risk factors or measures
- **211 synopses** on risk factors and measures effects
- **6 Accident scenario** factsheets

- **36 Economic Efficiency Evaluation examples** - Behaviour (12 examples), Infrastructure (19 examples), Vehicle systems (4 examples), Post-impact care (1 example)

Links within a systems approach:

- A total of **762 links between risk factors and measures**. Risk Factors (118) are linked to one or more Road Safety Measure(s) (167) - A few risk factors or measures (e.g. post-impact care) were not "linkable".
- **3350 database keywords**, out of which 2005 useful keywords, **linked with 531 Master keywords**
- A total of **380 links between risks, measures and Accident Scenarios**; 8 scenarios are linked with 109 specific risks and 271 specific measures.

Detailed information about the development and DSS status at the end of the SafetyCube project are available in Yannis & Papadimitriou (2018). An overview of the scientific content of the DSS and a summary of the methodology used to develop the DSS can be found in the SafetyCube Final Project Report (Thomas & Talbot, 2018).

## 2.2 ADDED VALUE OF THE DSS

The DSS is a valuable tool for developing evidence based road safety policies. The DSS enables users to understand risk factors and select the most appropriate and cost-effective approaches to reduce road casualties. The DSS goes above and beyond existing decision support systems (e.g. CMF Clearing house, PRACT Repository etc.) by:

- Taking a holistic approach considering road users, infrastructure, vehicles, and post impact care.
- Demonstrating the links between risk factors and respective measures.
- Systematic approach to selecting included information.
- Rigorous selection criteria to prioritise the highest quality evidence.
- Synthesis of information through a clear approach to meta-analysis and vote count analysis.
- Presentation of key information about each included study without the user requiring access to the original source
- Informative evaluations of each risk and measure in the form of synopses.
- Applying a common ranking system; colour codes are applied to all risks and measures so it is possible to compare the relative risk and effectiveness of risks and measures.
- Providing cost benefit analysis examples for selected measures.
- Providing guidelines for the estimation of MAIS<sub>3+</sub> injuries to obtain estimates that are better comparable between countries
- Applying a rigorous quality assurance process to all content.
- A user friendly and easy to use interface design
- Inclusion of risk factors in addition to measures is a unique feature of this DSS system.

As a consequence of the dedicated design approach it is the only road safety DSS with the following features:

- Linked information about crash risks and measures so that users can be directed from problems to solutions.
- Takes a holistic approach considering risks and measures from across the road system (road users, infrastructure, vehicles and post-impact care)

- Provides comprehensive synopses with accessible information for users of various backgrounds.

The added value of the DSS has been recognised by users as evidenced by the positive feedback received at the final project conference and webinar. During the conference there was a wide spread view that the DSS is an excellent outcome which should be continued beyond the end of the project. Comments included recognition of the potential for global application and the value for money represented by a “one stop shop” for all road safety risks and measures.

# 3 Future DSS



This Chapter outlines the best case scenario for the future DSS. These aspirations are informed by the feedback of the early users of the DSS. In this best case scenario, the DSS continues to provide an up-to-date and comprehensive overview of all relevant information on road safety risks and measures to support policy makers and other stakeholders worldwide. It concerns an expansion of both the contents and functionality of the current DSS.

The SafetyCube project has established the structure of the European road safety DSS and completed the first round of content population. Now that the DSS is operational it can provide a valuable service to users. It is however a living tool that can and ideally should be enhanced in the future. This chapter presents the best case scenario for the future DSS. This best case scenario is based on feedback of the early users of the DSS. Implementing the discussed developments will ensure longevity and enhancement of the tool.

Suggestions provided by users mainly concerned contents and functionality of the DSS. Section 3.1 discusses the best case scenario for the future DSS regarding contents, whereas Section 3.2 discusses functionalities that should ideally be included. Section 3.3 discusses organisational issues that should be taken into account. Please note that “best case” does not necessarily mean to add ‘all’ possible extensions that users have suggested. Rather, it is a future where those suggestions offering best value for money are incorporated into the DSS. Any stakeholder suggestions which have limited added value are not included in this best case scenario.

## 3.1 FUTURE CONTENTS

User needs vary between specific user (group) and problem. Consequently, an extensive amount of information is included in the DSS. The range of stakeholders necessitated a broad approach in selecting all risks and measures for inclusion. However, within the available project resources, it was not possible to code all relevant studies for all relevant topics. For topics where many relevant studies were identified, the most relevant studies were selected on the basis of pre-defined selection criteria including: recency, type of publication (preference for peer-reviewed journal papers) relevance for the EU situation (preference for EU above other high income countries, preference for high income countries above low and middle income countries) and language (limited to languages understood by coder). Ideally, **more studies** will be included in the future. For example, **studies from outside Europe** could be added to give the DSS a more global perspective. Moreover, inclusion of studies in **other languages**, including ‘**grey literature**’ would provide a clearer picture of the actual magnitude of risks and effectiveness of measures as peer-reviewed journal articles might be biased towards significant effects. Especially for **new road safety issues or measures** such as vehicle to infrastructure and vehicle to vehicle communication, the current scientific knowledge will quickly develop and DSS content should be updated.

The DSS could also be extended with additional information on the **effectiveness of measures on serious road injuries**. Traditionally, road safety policy making was mainly focused on reducing the number of fatalities. Recently, serious road injuries – in the EU

defined as non-fatal casualties with an injury severity level of MAIS<sub>3</sub>+ are increasingly being adopted as an additional road safety policy indicator. Certain measures are probably less effective for reducing non-fatal injuries than for reducing fatalities, whereas other measures might be more effective for non-fatal injuries. Currently, the synopses summarize the effects that are reported in the coded studies. In some cases, these effects refer to fatalities or fatal accidents, in other cases the effects refer to all casualties or all crashes or killed and seriously injured (KSI) casualties or crashes. A future extension of the DSS would focus more on effectiveness of measures for different levels of crash severity in (a selection of) synopses.

Furthermore, the needs of low- and middle income countries differ from traditionally motorised, high income countries. Some **customising** will add value to the DSS in order to not show irrelevant information, highlight important elements and add targeted information. This could include specific risks and measures that have different values costs (e.g. labour) and benefits (e.g. enforcement) for developing countries. Additionally, the contents of the individual study pages, in particular the summary table, could be further customized to user needs and available information. Within the back-end database, a greater volume of information has been coded for all studies. Users could be allowed to request additional information from the back-end database for the studies they are interested in.

Thirdly, the **linking between risks and measures** is largely based on a theoretical model. Within the SafetyCube project it was not feasible to fully validate the models and links between risks and measures. Further validation of the linking process, on the basis of information from evaluation studies, could further improve the quality of the contents of the DSS.

Moreover, risks and measures can be **interdependent**. For airbags and seat belts this is rather obvious; the safety effect of an airbag is less when the driver is wearing a seat belt. For road characteristics and speed enforcement this is more complex, although it is known for example that combining drink-driving campaigns and enforcement yields better results than the sum of the individual measures. In the current version of the DSS, interdependencies are discussed in the relevant synopses, on the basis of information that is available in the literature. Interdependencies could however be emphasised and displayed through a linking system in a similar visual manor to the links between risks and measures. Moreover, literature searches focussing on interdependencies between risk factors and measures might result in more information on these interdependencies. This information could be combined with expert knowledge to provide a more comprehensive overview of (possible) interdependencies.

Finally, road safety risks and measures are related to other important **societal issues**. For instance, when drink-driving occurs it is still a major problem but it is now a problem for a relatively smaller proportion of drivers than historically was the case. Consequently a greater proportion of drink drivers may be problem alcohol users. Helping them will also have an effect on health, relatives, friends etc., quality of life in general. Traffic calming in residential areas will make cities more liveable and attractive to active transport modes (walking, cycling) and subsequently increase public health. This information could be added to the synopses and could also be included as side effects in cost-benefit analyses. Adding this information and insights will help getting support for measures from other (policy) areas or even attract extra funding.

### 3.2 FUTURE FUNCTIONALITIES

First of all, an important extension will be the translation of the DSS in different **languages** to facilitate more user groups in e.g. Latin America, India, South East Asia, and other areas of the globe.

Second, the scope of the DSS can be expanded, to also assist DSS users in other steps that need to be taken to improve road safety. The DSS supports the user in developing road safety policies, by offering information on the magnitude of road safety risks and the effectiveness of road safety measures. Road safety policy makers and other stakeholders can use the DSS to identify potential countermeasures to tackle their risk factors and to select the most effective countermeasures.

As was mentioned by early users of the DSS, prior to selecting potential countermeasures, a policy maker needs to analyse the current situation and needs to determine which road safety problems are most relevant for the specific situation. Road safety problems can for example refer to certain groups of road users, certain risky road safety behaviours or certain types of roads. Although it is outside the scope of the DSS to provide a tool to perform the problem analysis, the DSS could be extended with information and links to other tools/resources to **assist** policy makers and other stakeholders in their **analysis of road safety problems**. The European Road Safety Observatory (ERSO) contains information that is very useful in this respect. The link with ERSO could be strengthened or the information from ERSO could be incorporated in the DSS.

After selecting the most appropriate countermeasure, it needs to be implemented. Also related to the **implementation of road safety measures**, early users suggested that the DSS could provide more **guidance**. The DSS could be extended for example with guidelines, best practices or links to relevant organisations or websites to assist users in implementing road safety countermeasures.

Another potential added functionality refers to serious road injuries. As was mentioned in the previous section, **serious road injuries** are increasingly being adopted as an additional road safety performance indicator. In the EU, serious road injuries are defined as non-fatal road traffic casualties with an injury severity level of MAIS<sub>3+</sub>. Within SafetyCube, current and planned practices concerning the estimation of the number of MAIS<sub>3+</sub> casualties have been assessed and it was analysed to what extent differences in practices affect the estimated number of MAIS<sub>3+</sub> casualties. It was found that practices differ between countries and that the methodology has a considerable effect on the estimate. Therefore, within SafetyCube, guidelines have been developed to help EU member states to produce more comparable estimates. Future practices could be monitored and further guidance could be provided concerning the estimation and analysis of the number of serious road injuries.

### 3.3 ORGANISATION

The current DSS is made and owned by the SafetyCube consortium. As a start this group will act as **developing organisation**. This organisation is responsible for promoting the usage of the DSS via each consortium members' network and presentations at (inter)national events. Moreover, to enable further development and operation of this best case scenario, additional funding is inevitable. Therefore, within the SafetyCube project, efforts are made to find **funding**. It is foreseen that multiple sources need to be found. At a later stage a **legal entity** needs to be formed, consisting of parties that will contribute to

the extension and operation of the DSS. It will have a leader, steering group and partners, similar to the SafetyCube consortium.

Further developments will most likely not involve all partners and could have contributions from outside the consortium. Funding parties will have their own wishes with respect to availability of the DSS. Therefore, **IPR** (intellectual property rights) issues need to be covered in the set-up of the organisation responsible for future operation and further development of the DSS. In addition, the timeframe and schedule for the future enhancements will be agreed with the funding parties. The exact timeframe will depend on the financial resources available to support the future DSS. It is anticipated that two physical meetings and multiple phone meetings will be held each year to co-ordinate work. It is planned that the DSS itself be updated at fixed time points throughout the year. The number of times the DSS is updated in a year is dependent on funding. In the best case scenario it is envisaged that the DSS would be updated four times per year.

The DSS website is in operation and has been publically available since October 2017. The organisation will be responsible for **future operation** of the DSS website. It is possible that part of the future website could include a dedicated or restricted section for different user groups (e.g. through a subscription service). The DSS is designed to be self-explaining and contains short instruction videos as well as a quick guide for users. Web traffic statistics showing how the DSS is used provide useful information for the further development of the DSS. It can be used to select areas that could be upgraded and extended first. In addition, also feedback from users can be used to decide on further developments of the DSS. In fact, the further developments that are described in this report mainly result from early user feedback.

Further **development** of the DSS will be along the lines used in SafetyCube, including quality assurance procedures and field testing of improvements. It might be possible for external people to add contents to the DSS, yet this should be done following the methodology developed within SafetyCube and all additional contents will have to go through the quality assurance process described in the DSS.

# 4 Information for potential funders



This chapter provides basic information for potential funders of the DSS. Further information can be found in Appendix A.

## 4.1 INTRODUCTION TO THE MARKETING PACKAGE

The SafetyCube DSS has been developed within the Horizons 2020 SafetyCube project. It has been funded by the European Commission, however the intellectual property is owned by the SafetyCube Consortium. As such the DSS product developed within the research project can have continued independent operation after the end of the research project.

It is intended that the SafetyCube DSS will remain in operation **long after the end of the project** and it will be gradually become a reference Information System, in which more and more road safety experts and organisations contribute their studies with quantitative results, using the SafetyCube protocol.

The main objective of the Marketing Package is to **explore the possibilities** for the continuation of the operation of the SafetyCube DSS after the end of the SafetyCube project and the respective period covered by the European Commission financing (up until 30 April 2018). This information is presented in context of the best case scenario described in Chapter 3.

## 4.2 OPERATION SCENARIO AFTER THE PROJECT END

After the end of the SafetyCube, there are different options for how the development of the DSS system can unfold, dependent on the degree on received funding. The optimal scenario is for extended growth of the DSS. The extended growth scenario concerns a future version of SafetyCube DSS operation, **with considerable external funding**. The growth operation costs are covered by the external funding.

Following external funding to support DSS growth the best case scenario described in Chapter 3 will be achieved. This includes operational features such as:

- The uninterrupted operation of the system
- Updates of the contents and addition of new content
- Continued quality control
- Addition of studies in more languages
- Translation of the contents in other languages
- Information about the implementation of measures
- The incorporation of data and knowledge parts (e.g. similar to the SafetyNet and Dakota outputs).
- Data could concern road accidents, exposure and performance indicators
- Knowledge could concern state of the art road safety documentation and updated syntheses
- Etc...



The extent of the development of additional data and knowledge features depends on the size of the funding. It is envisaged that the future DSS will be financed by several Organisations, covering all the expenses while the brand remains property of the SafetyCube partners.

#### 4.3 ROADMAP OF THE OPERATION OF SAFETYCUBE DSS

The Roadmap for SafetyCube DSS has been established and followed up to the end of SafetyCube project (April 2018). The steps complete so far are:

- The SafetyCube Consortium has delivered a **high quality** Road Safety DSS.
- A comprehensive **marketing strategy** has been developed, accompanied by a robust, professional **marketing package** (see Appendix A for an example) which includes:
  - Explaining the system
  - Explaining the value of the system
  - An efficient governance
  - Demonstrating the costs
  - Highlighting the added value for the funding organizations
- **Governance** issues have been addressed
- **A tight time-schedule** that has been established and followed starting with the operation of the DSS (Oct 2017), which includes:
  - demonstration workshops
  - dedicated visits to the potential funding organizations

There are several **short term steps** which SafetyCube partners have undertaken in order to successfully get in contact with an Organisation to achieve the respective funding. These include:

- Identification of potential Funding Organisations and the contact person
- Sending a written communication (letter) to the contact person
- Arranging for a meeting with the contact person
- Sending the Marketing Package
- Meeting with the contact person

#### 4.4 SAFETYCUBE DSS PROMOTION EVENTS

In addition to the previous activities, SafetyCube partners have been undertaking or joining a series of promotional events in order to **advertise the work carried out** within the SafetyCube project. The events that have had SafetyCube participants so far are listed below, while additional ones will be pursued for the future months.

##### SafetyCube Demonstration Workshops

- SafetyCube DSS Opening (Brussels, September 2017)
- SafetyCube DSS Workshop (Rome, November 2017)
- SafetyCube Final Conference (Vienna, March 2018)

##### Presentation at conferences

- IRTAD Conference (Marrakesh, October 2017)
- Road Safety and Simulation (Hague, October 2017)
- Polis Annual Conference (Brussels, December 2017)
- Transportation Research Board (Washington, January 2018)
- Transport Research Arena (Vienna, April 2018)
- Other National-level Conferences (e.g. ICTR, Thessaloniki, September 2017)

The full list of promotion events is continuously updated and is available at the SafetyCube project website ([www.safetycube-project.eu](http://www.safetycube-project.eu)).

# 5 Conclusion



As the SafetyCube project ends its legacy lives on in the European road safety DSS.

The European Road Safety DSS is a user friendly, web-based, interactive decision support tool which can be used to **substantiate road safety decisions using an evidence base**. A dedicated methodology has been created to establish taxonomies, code scientific literature and synthesise state of the art knowledge into easy to understand synopses suitable for users of a range of backgrounds. The wealth of information contained within the DSS covers the road safety risks and measures associated with road user behaviour, infrastructure and vehicles, as well as a dedicated section for information on serious injury, example cost benefit analysis and an economic efficiency evaluation tool for estimating the cost effectiveness of road safety measures. A full description of the DSS can be found in Yannis & Papadimitriou (2018). An overview of the DSS scientific content as well as a summary of the methodology used to develop the DSS can be found in the SafetyCube Final Project Report (Thomas & Talbot, 2018).

A great opportunity is now available to finance the DSS and enhance it for the future. The future funder(s) of the DSS will be contributing the Global UN Sustainable Development Goals on road safety by taking a leading position to **actively promote effective solutions to road safety's most pressing challenges**. The funders are vital for ensuring that the DSS meets its full potential, their input will facilitate achieving aspirations for an enhanced DSS including:

- Expanded content
- Customisation for low and middle income countries
- Validation of the theoretical model for linking risks and measures
- Focus on interdependencies of road safety measures.
- New knowledge on the implementation of measures.
- Enhanced information on serious road injuries
- Translation of content into different languages.
- Customisable options for content display.

The fully funded enhanced DSS will be best placed to facilitate **knowledge sharing to strengthen links between global and local road safety activities**. As such the future DSS and its funders have a leading role to play in promoting awareness and responsibility among all policy makers to ensure safe roads for all.

# 6 References



Thomas, P and Talbot, R (Eds) (2018), Final project report, Deliverable 1.4 of the H2020 project SafetyCube.

Yannis G., Papadimitriou E. (Eds) (2018), The European Road Safety Decision Support System - A clearinghouse of road safety risks and measures, Deliverable 8.3 of the H2020 project SafetyCube.

# 7 Appendix A



[www.roadssafety-dss.eu](http://www.roadssafety-dss.eu)

## SafetyCube DSS: a long waited powerful tool

- SafetyCube DSS is the first integrated road safety support system **developed in Europe**
- SafetyCube DSS **offers for the first time** scientific evidence on:
  - risks and not only measures
  - risks and measures not only on infrastructure
  - a very large number of estimates of risks and measures effects
  - links between risks factors and measures
- SafetyCube DSS is **a reference system** for road safety worldwide, constantly improved and enhanced



Proposal for the Sponsor – SafetyCube Cooperation, April 2018



## Proposal for funding of the SafetyCube DSS by the Sponsor

1. The SafetyCube Group
2. The SafetyCube DSS
3. The future operation of SafetyCube DSS
4. Cooperation Framework



Proposal for the Sponsor – SafetyCube Cooperation, April 2018



# The SafetyCube project



Funded by the European Commission under the **Horizon 2020** research framework programme

Coordinator: Pete Thomas, Loughborough University

Start: May 2015

Finish: April 2018

17 partners from 12 EU countries



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# The SafetyCube Group Legal Entity (1/2)

SafetyCube Group is a new Legal Entity, in charge of operating the SafetyCube DSS after the end of the SafetyCube project (starting on May 2018).

The SafetyCube Group is composed by:

- the Leader
- the Steering Committee
- the Partners

All tasks are assigned by the SafetyCube Group Leader to the respective partners after proposal by the Steering Committee.



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## The SafetyCube Legal Entity (2/2)

The Leader - Loughborough University  
in charge of any internal and external legal commitments.

The Steering Committee :

- Loughborough University (UK)
- National Technical University of Athens (NTUA - GR)
- VIAS Institute (B)
- SWOV Institute for Road Safety Research (NL)
- Austrian Road Safety Board (KFV - A)
- SAFER Vehicle and Traffic Safety Centre (CHALMERS - S)
- Laboratory of Accidentology, Biomechanics and Human Behaviour (LAB - F)



The other partners:

- Institute of Science and Technology for Transport, Development & Networks (IFSTTAR)
- Institute of Transport Economics (TØI)
- European Union Road Federation (ERF)
- Centre for Transport and Logistics, University of Rome "La Sapienza" (CTL)
- Centre Européen d'Etude de Sécurité et d'Analyse des Risques (CEESAR)
- Agency for Public Health, Barcelona (ASPB)
- Medical University of Hannover (MHH)
- Slovenian Traffic Safety Agency (AVP)
- Foundation for Transport and Energy Research and Development (CIDAUT)
- DEKRA Automobil GmbH

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## The SafetyCube DSS



*The SafetyCube DSS is*

**a user friendly, web-based, interactive Decision Support Tool** to properly substantiate road safety decisions to be implemented at local, regional, national, European and international level.

It contains:

- road accident **risk factors** and problems
- road safety **measures**
- best estimate of **cost- benefit/effectiveness**
- all related analytic **background**

Special focus on **linking** road safety problems with related measures.



SafetyCube



SafetyCube



SafetyCube

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## Current Road Safety DSS Worldwide



- Crash Modification Factors Clearinghouse ([www.cmfclearinghouse.org](http://www.cmfclearinghouse.org)) by NHTSA (USA) - **6.251 CMF** on infrastructure only - on going
- Road Safety Engineering Kit ([www.engtoolkit.com.au](http://www.engtoolkit.com.au)) by Austroads (Australia) - **67 treatments** on infrastructure only
- PRACT Repository ([www.pract-repository.eu](http://www.pract-repository.eu)) by CEDR (Europe) - **889 CMF and 273 APM** on infrastructure only – high quality
- IRAP toolkit ([toolkit.irap.org/](http://toolkit.irap.org/)) by IRAP - **58 treatments** (43 on infrastructure)
- Safety Performance Factors Clearinghouse ([spfclearinghouse.org](http://spfclearinghouse.org)) by Tatum Group LLC, Dr. Andrew Kwasniak (USA) - **few SPF** – subscribers only

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## SafetyCube DSS Users

- **Public Authorities**  
local, regional, national, European and international
- **Industry**  
Infrastructure, Vehicle, Insurance, Technology
- **Research Institutes, Experts**
- **Non Governmental Organisations**
- **Mass Media**
- **Everyone**



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## SafetyCube Scientific Methodology

1. Creating **taxonomies** of risk factors and measures
  2. Exhaustive literature review and rigorous study selection criteria
  3. Use of a template for **coding studies**, to be introduced in the DSS back-end database
  4. Carrying out meta-analyses to estimate the effects of risk factors / measures.
  5. Drafting **Synopses** summarising results of risk factors / measures.
- **Systems approach:** links between infrastructure, user and vehicle risks
  - Emphasis on risk factors and measures of **priority issues** (VRUs, ADAS, speed management, distraction, etc.)
  - Rigorous assessment of the **quality of the data / study methods**



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# SafetyCube Taxonomies

## Three-level taxonomies Separately for risks and measures



- **4 Categories**  
road user, infrastructure, vehicle, post impact care
- **88 Topics**  
e.g. distraction, roadside, crashworthiness
- **175 Specific topics**  
e.g. mobile phone use, no clear-zone, low pedestrian rating (NCAP)

Issue	Infrastructure	Vehicle	Post-impact Care
Law enforcement	Traffic flow	Police report	Automated vehicles
Education and outreach/traffic programs	Traffic congestion	Side impact	Extricator for vehicle
Driver training and licensing	Forma (road) address (not reflect) sidewalks	Rear impact	Pre-hospital medical care
Flashes for fire assessment and identification	Speed management / enforcement	Follow	Triage and evacuation from facilities
Access to emergency services	Road type	Pedestrian	Extricator for vehicles
	Road surface treatments	DMV	
	Road surface treatments	PTA	
	Visibility / Lighting treatments	Control	
	Woracles	MSR	
	Historical / Vertical alignment treatments	Computer	

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# Selection and Coding of Studies

**Study search in key databases**  
(Scopus, TRID, Elsevier, Taylor & Francis, Springer etc.)

**Study selection and prioritization criteria**

- Studies with quantitative results
- Meta-analyses, or other high quality studies (peer-reviewed journals)
- Recent studies

**Coding of studies in a dedicated template**

- Study design and methodology
- Results and their confidence intervals
- Study limitations



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## SafetyCube DSS Design Principles

- A **Modern** web-based tool
- Highly **Ergonomic** interface
- **Simple** structure
- Powerful **Search** Engines
- Fully **Documented** information
- Easily **Updated**



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## SafetyCube DSS Search Engine

- Fully **linked** search
  - search a road safety problem alone or through the measures
  - search a measure alone or through the road safety problems
  - search for risks and measures related to specific road user groups or crash types (accident categories)
- Fully **detailed** search
  - search by any parameter in each data table in the database
- Fully **flexible** search
  - adjust and customize search according to results
- Fully **documented** search
  - access background information at any stage (supporting documentation, links, etc.)



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# SafetyCube DSS Menu

- **Search**  
Risk Factors & Measures
- **Knowledge**  
211 Synopses, Serious Injuries, Accident Scenarios
- **Calculator**  
Economic Efficiency Evaluation
- **Methodology**  
System documentation
- **Support**  
Contact, help, feedback



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# The Search Structure

- **Search**  
(5 entry points)
- **Results pages**  
(Introduction, Colour codes, Synopses, Coded studies)
- **Individual Studies pages**  
(Disaggregate level, detailed effects listed, some studies not in synopses)
- **Links between Risk Factors**  
Information about which risks can be remedied by which types of measures



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# SafetyCube DSS Entry Points

- **Keyword search**  
(all database keywords)
- **Risk factor search**  
(taxonomy)
- **Measures search**  
(taxonomy)
- **Road User Groups**  
(database keywords related to each group)
- **Accident Categories**  
(inquiries about specific scenarios)



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# SafetyCube DSS Results Pages

## Search results

- Synopses, and their short summaries & colour codes
- Table listing the available studies

## Refine search

- Specific Risk factor / Measure
- Other search filters:
  - **Road user groups:** All, car occupants, drivers, passengers, PTW riders, pedestrians, cyclists, HGVs.
  - **Road types:** All, motorways, rural roads, urban roads
  - **Country:** EU, EU countries, US and Canada, Australia, Asia.

## Links to related measures

- Select a specific risk factor / measure
- Get the list of related measures



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# SafetyCube Synopses

## 211 Syntheses on risk factors / measures

### Summary (2 pages)

- Effect of risk factor / measure and ranking (colour code)
- Risk / safety effect mechanisms
- Risk / safety effects size, transferability of effects

### Scientific overview (4-5 pages)

- Comparative analysis of available studies
- Analysis results:  
Meta-analysis/Vote-count analysis/Qualitative analysis

### Supporting document (3-10 pages)

- Literature search strategy and study selection criteria
- Detailed analyses



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# SafetyCube Related Risks / Measures

- Linking based on a **dedicated model** categorizing risks

- Every Risk Factor (118) is **linked** to one or more Road Safety Measure(s) (167)

- Every Road Safety Measure (167) is **linked** to one or more Risk Factor(s) (118)

- A total of **762 links** between risk factors and measures



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# SafetyCube DSS Individual Study Pages



**Title, author, source, abstract**

- Link to URL for full-text download (depending on Institute permissions)

**Study design info:**

- Country
- Research Method, Design, Sample
- Exposure/Control group
- Risk/Outcome Group
- Modifying Conditions
- Potential limitations

**Study results:**

- Table listing the detailed effects reported in the study



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# SafetyCube DSS Calculator



- Combines information about the **effectiveness of a measure** (i.e. the percentage of crashes or casualties prevented) with the **costs** of this measure
- Integrates updated information of **crash costs in the European countries**
- Allows to express all costs and benefits of a measure in monetary values and conduct **cost benefit analysis**

**Main Functions**

- Perform cost-benefit analysis with **own input data**.
- Select one of the **SafetyCube examples** of cost benefit analyses
  - Measures with high effectiveness
  - For which reliable cost information could be found



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## SafetyCube DSS Knowledge Wealth



**SafetyCube DSS** contains:

- more than 1,250 **studies**,
- with more than 7,500 **estimates** of risks/measure effects on:
  - behaviour,
  - infrastructure,
  - vehicle, and
  - post impact care
- **211 Synopses**
- **36 cost-benefit analyses** (adjustable)



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www.roadsafety-dss.eu

**SafetyCube DSS**  
Proposal for funding of the SafetyCube DSS  
by the Sponsor

**The future Operation of  
the SafetyCube DSS**

## SafetyCube DSS operation after the project end

The future operation of the SafetyCube DSS concerns:

1. the uninterrupted operation of the current SafetyCube DSS
2. updates of the risk factors, measures and cost-benefit analyses (recent studies but also older ones)
3. add studies in more languages
4. translate the contents in other languages
5. possibility to receive, check and incorporate studies submitted by external experts and organizations and the respective quality control
6. incorporation of additional data and knowledge sections



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## Funding the future operation of SafetyCube DSS

- International Organisations
- National Authorities
- International Foundations
- Development Banks
- Road Safety International Stakeholders



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SafetyCube DSS  
Proposal for funding of the SafetyCube DSS  
by the Sponsor

# SafetyCube – Sponsor Cooperation Framework



## Cooperation Governance



Every year:

- Steering Committee **Meetings** twice per year with the presence of the Sponsor
- **Annual Plan and Budget** for the next year - submitted by 31 October
- **Annual Report** (technical and financial) - submitted by 28 February

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## Cooperation Marketing

- An **Annual Conference** promoting road safety and all the joint efforts of the SafetyCube DSS (organized jointly by the Sponsor and the SafetyCube Group)
- Various **presentations** of the SafetyCube DSS at targeted road safety stakeholders worldwide
- The **Sponsor logo** appears visible at:
  - the SafetyCube DSS website
  - every SafetyCube DSS presentation



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## Cooperation Benefits for the Sponsor (1/2)

- Contribution to the **Global UN Sustainable Development Goals** on road safety.
- Active promotion of the **Systems approach and the evidence-base** in road safety policy and practice, through the endorsement of a DSS explicitly designed on these principles.
- Global leadership in the **promotion of effective solutions** to road safety's most pressing challenges.
- Strengthening of international role by **supporting institutional and corporate partnerships** with a state-of-the-art Decision Support System



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## Cooperation Benefits for the Sponsor(2/2)

- **Enhance global road safety fact-giving** and information through a wealth of information.
- Strengthen the linkage and **coordination between global and local** road safety activities
- **Increase visibility** of efforts to promote road safety as a global challenge.
- Strengthen the leading role in **promoting awareness and responsibility** among all road users through education, campaign and information at global level



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## Sponsor - SafetyCube Cooperation in conclusion

- The ultimate objective of the Sponsor – SafetyCube cooperation is to develop a **global culture on road safety evaluations**
- **Accountability** offered by the SafetyCube DSS is the key to successful implementation of road safety policies worldwide
- **Accelerate** road casualties reduction worldwide.



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SafetyCube DSS [www.roadsafety-dss.eu](http://www.roadsafety-dss.eu)  
the European Road Safety Decision Support System  
[www.roadsafety-dss.eu](http://www.roadsafety-dss.eu)



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April 2018

