

Exploring the development of an open data platform for road safety KPIs

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Abstract

The paper aims to explore the development of a road safety Key Performance Indicators (KPIs) data ecosystem that could be integrated into the Transport Research Cloud as a subset of the EOSC platform. The necessary steps to be taken in order to make the KPIs data open, as well as the concept and the governance plan of an open platform for road safety KPIs (OPEN RSPI) have been explained. The emphasis is placed on the findable, accessible, interoperable, and reusable ecosystem as well as opportunities and barriers for data sharing. The development of an open platform allows researchers, practitioners, and road safety stakeholders to more promptly identify those critical factors contributing to road accidents and strengthen proactive road safety management.

Keywords

Road Safety; Key Performance Indicators; Open Data Platform; EOSC

1 Introduction

In order to better handle the road safety problem in the EU Member States (MS), the EC adopted the EU Road Safety Policy Framework 2021-2030, in which special emphasis has been placed on monitoring the road safety progress, at both national and EU level. To that end, a set of eight road safety Key Performance Indicators (KPIs) has been suggested to be collected under a common methodology by the EU MS, in order to better grasp different road safety issues and define the earlier goal-oriented actions. With an aspiration to become a global “digital data hub”, the EC adopted the European strategy for data in February 2020. Thus, based on the growing needs to facilitate data-sharing/reuse, the EC has initiated the development of the European Open Science Cloud (EOSC) since 2016 ([Anagnostopoulou et al., 2020](#)), with the aim to link the existing infrastructures from research sectors and Member States in order to ensure sharing of research data ([Böhm et al., 2018](#)). Within this context, the need for establishing a Transport Research Cloud (TRC) as a subset of the EOSC platform has already been declared ([Anagnostopoulou et al., 2020](#)), which will provide researchers in the transport and logistics domain with access to open data sets relative to their research interests in a consistent manner. The objective of the current paper ([Tešić et al., 2022](#)) is to explore the development of a road safety KPIs data ecosystem that could be integrated in the TRC as a subset of the EOSC platform. The paper describes the necessary steps to be taken in order to make the KPI data open, as well as the concept and the governance plan of an open platform for road safety KPIs (OPEN RSPIs).

2 Open data platform for road safety KPIs

The Staff Working Document titled EU Road Safety Policy Framework 2021-2030 – Next steps towards “Vision Zero” recommended the establishment of a range of road safety KPIs, at the European level. For all of these KPIs, the EC has defined a general methodological consideration applicable to all the indicators. The EC funded project Baseline (see <https://baseline.vias.be/>) has further developed a set of common methodological guidelines for the data collection and estimation of the KPIs in the EU countries, including minimum data requirements, measurement procedure and data analysis requirements.

2.1 Concept

Over the recent years, the need for open data, unified standards and flexible infrastructures in the transport research area has been more relevant than ever. The current open science-based initiatives supported by the EC and their embedded services in transport research area have been summarized by [Anagnostopoulou et al., 2020](#). The importance of collecting performance indicators has been also emphasized in [Yannis et al., 2020](#), including them in the structure of the road safety management, as part of the platform for global road safety data analysis. In accordance with the EC's efforts to ensure collecting and monitoring of KPIs at the EU level, as useful tools for monitoring road safety progress, the need to define an open data platform for road safety KPIs (OPEN RSPIs) has been widely recognized. Establishing the OPEN RSPIs as part of the TRC meets three strategic objectives relating to people, knowledge, and infrastructures, as defined in the Strategic Research and Innovation Agenda (SRIA) of the EOSC ([EOSC Executive Board, 2020](#)). Despite the fact that the platform provides a “new normal” related to the open science practices and data stewardship, the greatest contribution is expected in developing a web of FAIR data and related services that are underpinning the in-depth research addressing major road safety challenges.

An open data platform for road safety KPIs engagement of the wider public/ government sector and private sectors in the EOSC has been proposed. As shown in [Figure 1](#), the platform proposed can be exploited by both the EC/DG Move and the MS in order to monitor road safety progress, identify and exchange best practices through cross-country comparisons, as well as to identify major road safety problems. The governance plan implies a proxy at the national level (Route 1) between the EOSC-TRC and the leading government road safety stakeholder, which is responsible for KPIs measurement, collecting and monitoring at national level, as well as for national research and science stakeholders or private sector. In addition, the leading government road safety stakeholder and research stakeholders may engage in the EOSC via one or more umbrella organizations (Route 2), (i.e., ECTRI, FEHRL, etc.), addressing different layers of the EOSC, primarily the providers of the EOSC-Core and those enabling the EOSC-Exchange. Initially, both routes are acceptable since umbrella organizations are expected to bring their members closer to the EOSC and align their needs with EOSC principles. Within a context of established open science culture, Route 1 is indeed the most appropriate. No matter which route is used for communication with the EOSC, all Member States need to define methodology for collecting and monitoring KPIs, which is completely in line with the EC minimum methodological requirements. Nevertheless, this methodology should define a leading road safety stakeholder for collecting KPIs (e.g., leading traffic safety agency), the list of KPIs (in line with EC recommendations) and a list of additional safety performance indicators (e.g. related to vulnerable road users), a sustainable funding source for periodic, as well as mechanisms for reporting to the parliament, citizens, etc.

Being able to recognize the importance and generate the proposed platform value, as part of the EOSC-TRC, the governance plan implies direct involvement of the EC/DG Move, as a focal point for KPIs management at EU level. This concept encloses a strong collaboration with national road safety

stakeholders, a road safety management plan and the exchange of best practices at EU level. For this purpose, the following should be enabled as a minimum by the OPEN RSPIs platform: 1) Entering (meta) data of KPIs according to the EOSC- TRC requirements- EU level and EU MS level; 2) Data management that provides monitoring/ cross- country comparisons for each KPI individually- EU level; 3) Calculation of the key performance index and cross- country comparison- EU level; 4) Identification of the most significant KPIs in a territory- EU level; 5) Star rating of KPIs (incl. a larger number of indicators) and star rating of road user's behaviour- EU level; 6) Generation of results and reports according to the selection criteria of the EC/DG Move and leading road safety stakeholder- EU level and EU MS level; 7) Generation of results and reports according to the selection criteria of the academic and research stakeholders, and 8) Other attributes that can contribute to improving road safety.

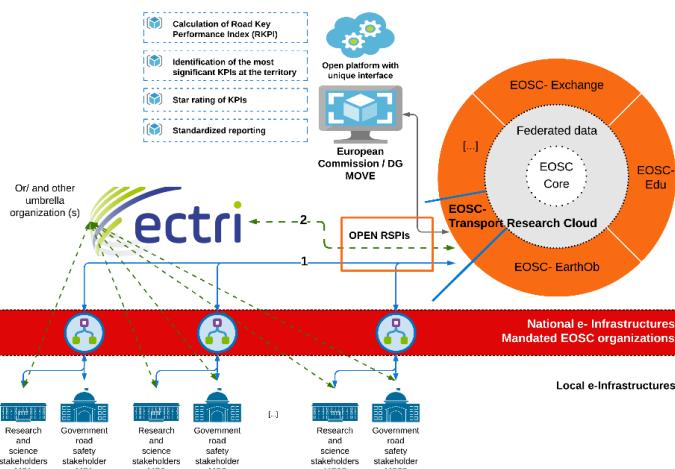


Figure 1. Concept of the open data platform for road safety KPIs (OPEN RSPIs), based on [[Manola et al., 2020](#)]

The collection of KPI data is conducted under contracts paid by taxpayer funds or under a publicly funded initiative/project, constituting them a public good, which should be open, easily accessible and reusable. Thus, the establishment of the OPEN RSPIs will contribute to building a research road safety environment that will promote the Open Science and increase the trust and reproducibility of research outcomes.

2.2 FAIRness of road safety KPIs data

The implementation of the FAIR principles relies on the following essential components: policies, data management plans, identifiers, standards, and repositories ([Collins et al., 2018](#)). In the context of an open KPI data ecosystem, data policies could be issued by the EC/DG Move, leading road safety stakeholders at EU MS level, as well as by research and other related stakeholders. Additionally, Data Management Plans (DMP), which will articulate all relevant information concerning the generation or collection of publicly funded research data ([Collins et al., 2018](#)), will hold valuable information on the data and related outputs, should also be ensured and structured in a machine actionable way.

With the development of the proposed OPEN RSPIs platform, having a unique interface and enabling a triangle knowledge exchange such as: 1) the EOSC/TRC and the EC/DG MOVE; 2) the EOSC/TRC and leading road safety stakeholders at EU Member State level, and 3) the EOSC/TRC and academic stakeholders, it will be possible to ensure the interconnectedness of people, services, and content. The challenges can occur in the semantic layer, when it comes to differences in the definitions of certain indicators (e.g., applicable legal provisions relating to the maximum permitted BAC, etc.). In open science, data must also be shared in such a way that both humans and machines are able to access, understand, and reuse them ([Yannis and Folla, 2019](#)). A key issue of the reusability of KPIs dataset is the availability of high-quality metadata, which will provide precise information on data collection

procedure and methodology, data process, data owners, access to data, etc. From the point of view of data, the biggest challenge can be the preparation of raw data due to the size and complexity of the KPIs datasets. By using the proposed platform, it is possible to overcome this problem by providing the unique interface and strong data entry instructions for the leading road safety stakeholder at the EU MS level. To provide a higher level of interoperability and reuse, the OPEN RSPIs platform should enable exporting or generating standardized reports which will be published by the EC/DG Move or the leading road safety stakeholders of the EU MS.

3 Opportunities and barriers to road safety KPIs data collecting and sharing

The use of to- date scientific and technological achievements in the field of information and communication technologies, cloud computing, artificial intelligence (AI) and Internet of Things (IoT) can significantly improve road safety across Europe for all road users. Under this assumption, it is possible to generate substantial amounts of KPIs data, obtained from various projects, naturalistic driving studies, field operational tests, smart cameras, advanced smart solutions in urban area, smart in-car solutions, etc.

However, the numerous challenges that can hinder the reuse of KPI data are listed in [Böhm et al., 2018](#), among which the following ones stand out: data storage, fragmentation of data ownership, a lack of interoperability between datasets and platforms, etc. In addition to these challenges, the following challenges have emerged onto the surface, relating directly to the KPI data: funding and sustainability of collecting KPIs data, data quality, diversity of definitions of a wider list of road safety indicators and several ethical issues arising from opening up the raw/ survey KPIs data, such as: personal or privacy sensitivity and intellectual property rights. Eventually, the ethical issues can be overcome by means of the proposed unique interface within the OPEN RSPIs platform, which requires the entry of aggregate data for each KPI individually.

4 Conclusions

The development of a TRC as a subset of an EOSC platform, provides the conditions for comprehensive management of the KPIs data. Through the paper, guidelines are given for development of an open data platform for road safety KPIs that could be integrated in the TRC. More precisely, the paper describes the necessary steps to be taken in order to make the KPIs data open, as well as the concept and the governance plan of an open platform for road safety KPIs (OPEN RSPIs). The development of the OPEN RSPIs platform enables comprehensive and periodic monitoring and management of the KPIs at the EU level, sets ambitious national KPI targets, a more accurate identification of good and poor road safety points, identification of the critical factors leading to road accidents, as well as strengthening the proactive road safety management. By using to-date scientific achievements in road safety management, as well as technological achievements in the field of information and communication technologies, the development of the OPEN RSPIs platform does not require large resources (architecture, infrastructure, services, and other requirements) and could be a very useful tool in the hands of the EC/DG Move and national road safety stakeholders.

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